

JLMahJongg App User's Manual

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Overview

Playing Online. Select the online single player start button [here](#). The first time you start, 1) Select a Skill Level using the drop-down menu (select the “Skill Level” button and then select Beginner, Intermediate, or Pro) (Figure 1), 2) Enter a name for your player (skip the name entry if you don’t have a keyboard) (Figure 2), 3) Select a card from the Card Type drop down menu or use the default card listed. (Figure 3), 4) Press "Start New Game." If you set Skill Level to Intermediate or Pro, the Advanced Setup button will be available.

You can also select the Tutorial Demo button to watch a game played by 4 computer players (CPs). The demo will explain the game steps and what happens during the game.

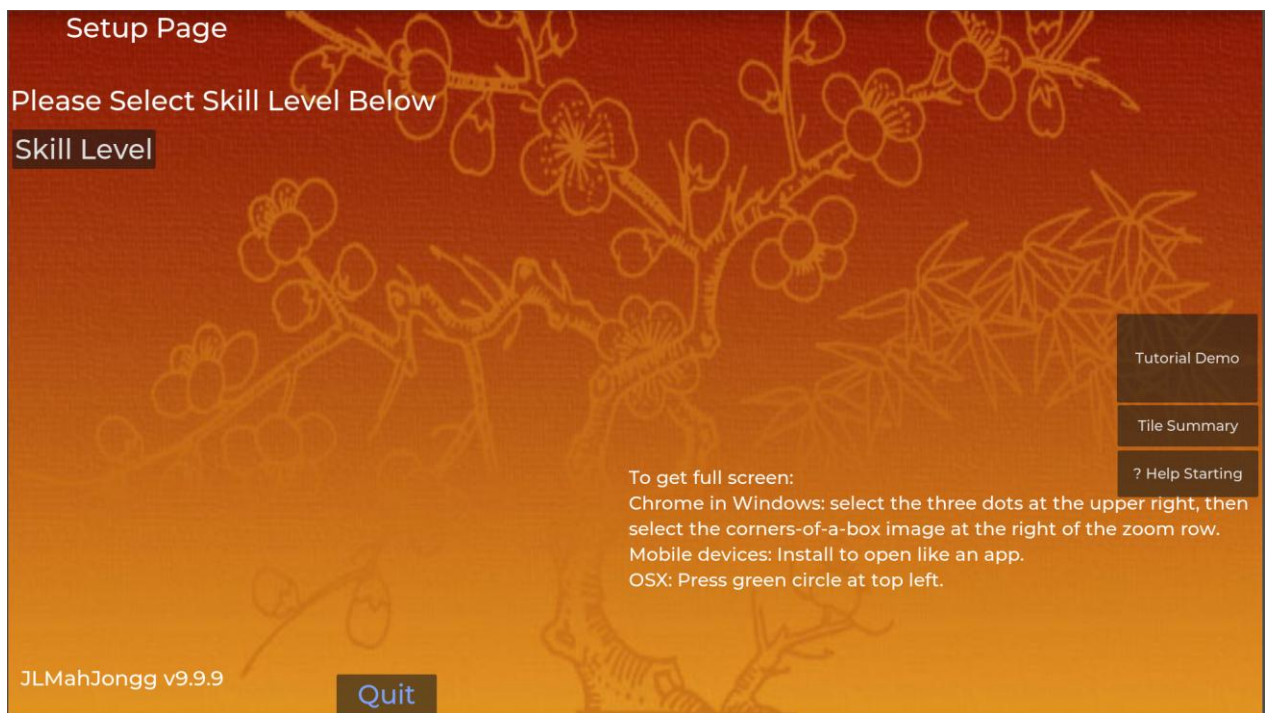


Figure 1. *Skill Level Entry when Playing Online.*

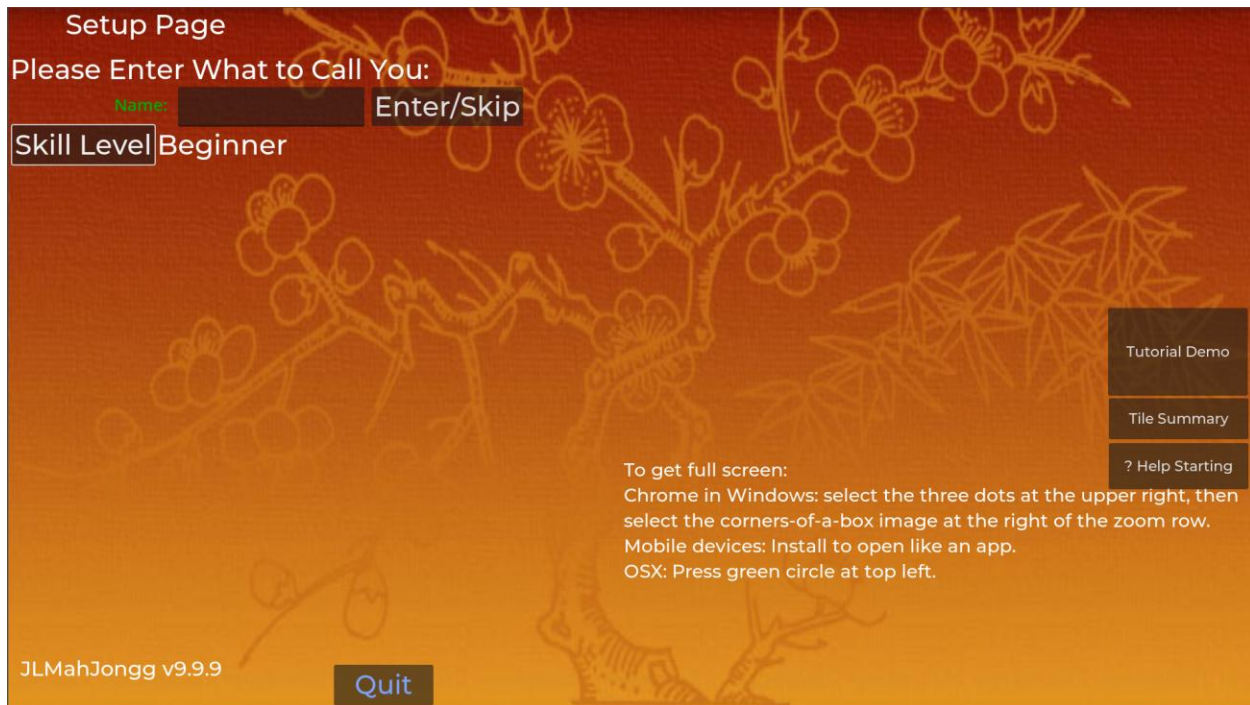


Figure 2. *Your Name Entry when Playing Online.*

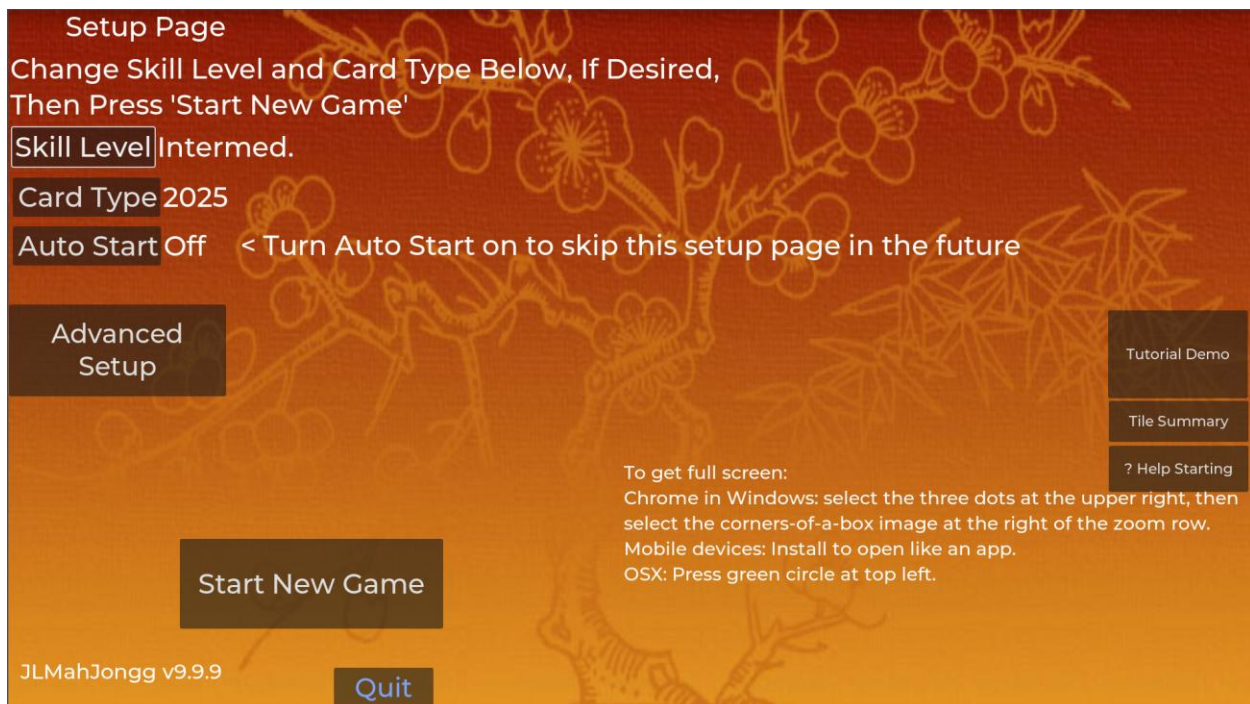


Figure 3. *Options to Change Card Type, Turn Auto Start On, and Change Setup when playing online.*

After pressing “Start New Game,” a display like that shown in Figure 4 should be displayed.

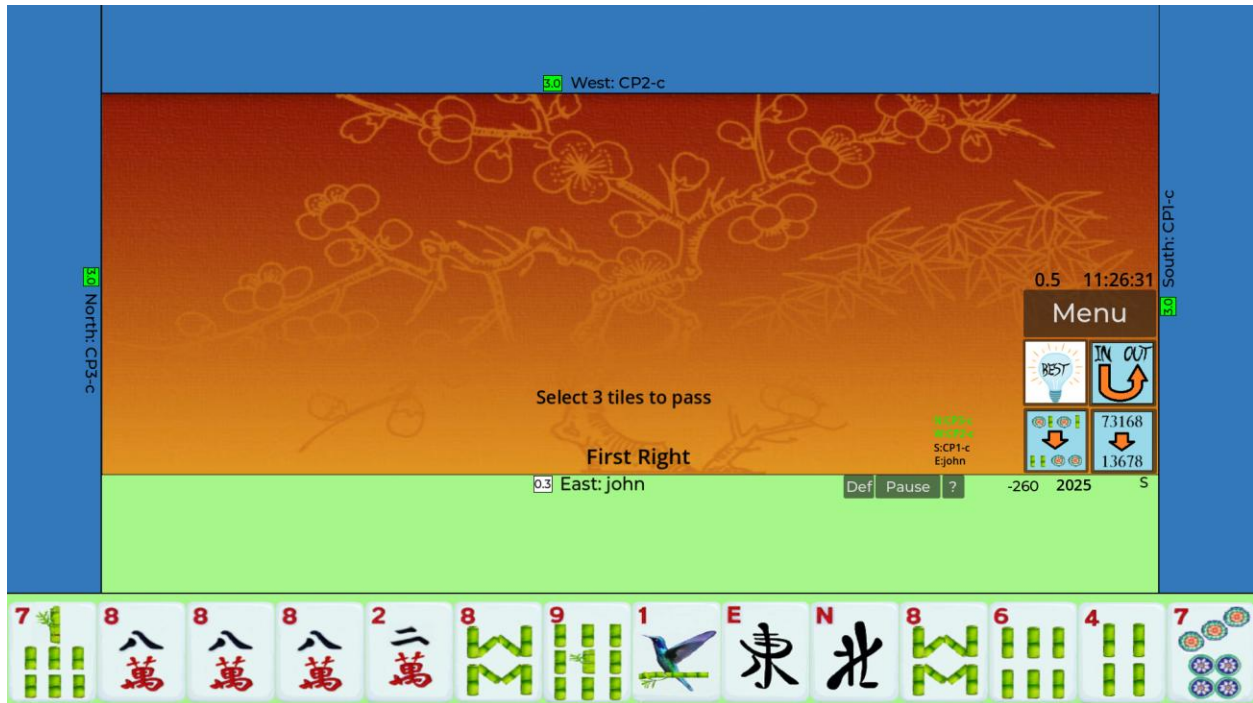


Figure 4. *Starting Display Example.*

Multiplayer App Download. To get and run the JLMahJongg App for the first time:

For Apple and Android (Google) devices, download (free) from the Apple App Store or the Google Play store. You can find it by searching on “JLMahJongg.” For Windows or Linux, go to the online web JLMahJongg downloads page [here](#). Follow the instructions for your device type. JLMahJongg is available in the Microsoft Store for windows.

Run the app according to the instructions.

NOTE: Most users so far are only interested in practicing against 3 (all) computer players (bots). In this case, there is no need for a dedicated account. Most settings and records are stored local to your device. You can change your name from the default guest account name by pressing the “Profile” button and entering your desired name.

If you select “Guest Login,” you will go directly to the Setup/Lobby page. First-time users default to Beginner Skill Level (skill means with both with the JLMahJongg app and with playing Mah Jongg) and the 2025 Card Type. These can be changed from the drop-down buttons. An Advanced Setup button can be later used to change other settings but should not be needed for those new to the JLMahJongg app. (Advanced Setup is not shown to first time beginner users). See Setup Options [here](#) for details.

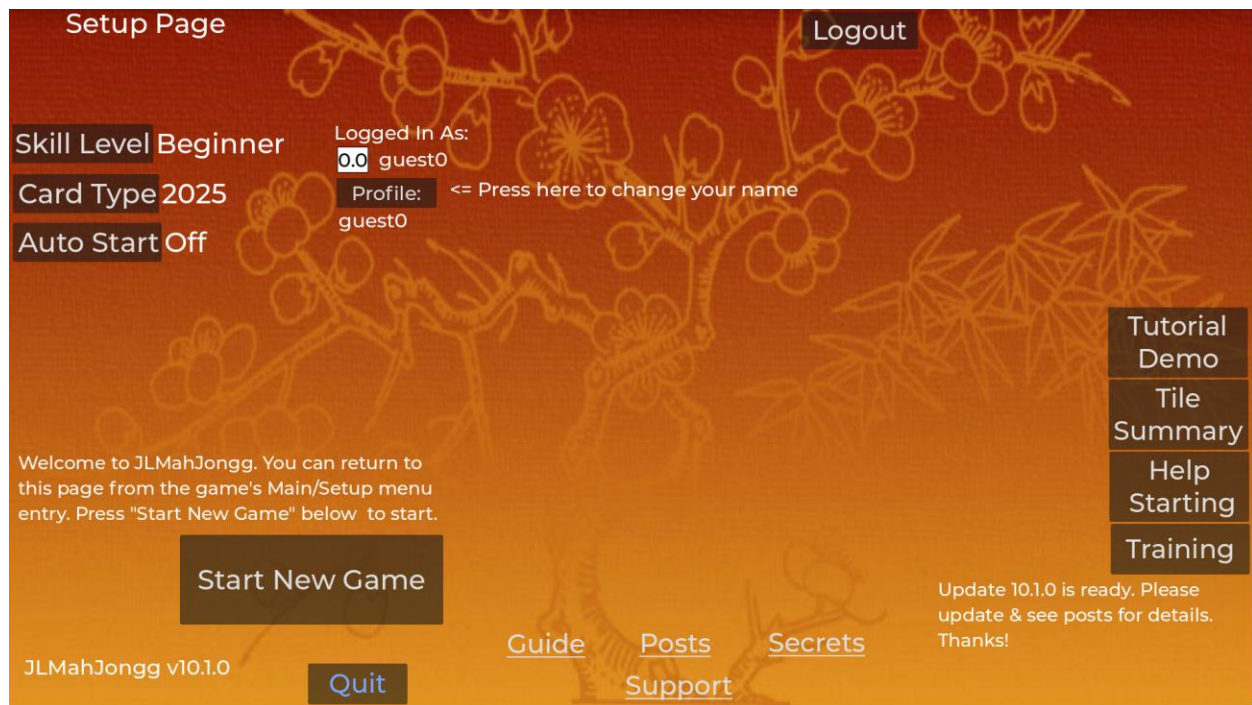


Figure 7. *First Time Run – Setup Display.*

If you have a password-protected dedicated account, you need to first enter the password in the “Password” box. **Note:** Guest Accounts are shared and cannot be password protected. Then press the “Login” button to continue to the Setup/Lobby page. An example lobby page with the network enabled is shown in Figure 9.

Note that the server name and current network settings are shown at the top left of the green Mah Jongg Lobby area. Our primary server is jlmahjongg.com. Below that is the current status of all the user accounts.



Figure 9. Setup/Lobby Page Example with Network Enabled (R).

A dedicated user will either see the “Host” button or a “Start New Game” button, depending on if the network is enabled. When the network is enabled, you have the options to host a game or join some other host’s game (if one exists). The server name and the current network setting are shown at the top of the green lobby display.

Getting Started. Selecting a card defining winning Mah Jongg hands: Choose by selecting “Card Type” in the Options menu. The National Mah Jongg League, Inc (NMJL) sells a new card each spring (nationalmahjonggleague.org). To play using the 2026 card, select 2026 on the “Card Type” menu. Note: because the NMJL cards are copyrighted, you can’t view the card from the app unless you type it in yourself using the card editor. You can only see the win history and the number of wins for each line on the card.

Or select any other card listed. Several free cards with different difficulty levels are listed in Appendix A and can be printed. Basic1 is a simple card designed for beginners. Basic1 and other free cards are described in [Appendix A](#). Learning how to correctly read the card is usually the most difficult part of learning how to play American Mah Jongg. Appendix A gives a brief tutorial on how to read a simple card.

The other sometimes difficult thing is choosing what hand to try to make. Options for choosing a hand after starting a game:

- 1) Manually decide what hand to make by comparing tiles you have with winning hand tiles.
- 2) If Help Level “All” is enabled, you can use the “Hint” feature. Hint shows the best hand below your tiles (Table Type “Table 2”) or merged with your tiles (Table Type “Table 1”). Table Type “Table 1” marks needed tiles by shading them. Shade colors: White-still available, Yellow-need a joker, Red-can't call because it's a closed hand.
- 3) If Help Level “Basic” or “All” is enabled, you can choose a hand from the "Best Hands" display. Selecting the first tile on the left of a “Best” hand brings up hint using this hand.

You can run the app in ‘Demo Mode’ by selecting the ‘Tutorial Demo’ button at the right center of the Setup/Lobby display (Figure 9 above). The demo walks through a game being played by 4 computer players (CPs) using a special demo display table. Although very busy, this special table lets you see all the player’s tiles and what they are trying to make. Don’t worry, the actual table displays are much simpler. The demo can stop and give an explanation about anything new that happens. You can adjust the demo speed after starting. You can return to the Setup/Lobby page from the Demo, but will need to restart the app to play a real game.

Important Rules

1. Cannot call a single tile, pair of tiles, or for a closed hand unless for Mah Jongg
2. Cannot call or pass jokers and can only exchange for them during your turn
3. Cannot use a joker in a single or a pair, **ever**

The following sections give an overview of the American Mah Jongg game and details on the JLMahJongg app. You can skip this if you already know how to play or do not need advanced app features.

Support. For game support, comments, or questions, please post on the support website or send email to: seasidedreamllc@gmail.com

Our support web site is: <http://JLMahJongg.com>.

Mah Jongg Game Summary. There are many variations of Mah Jongg. The variation played by this app is called “American” Mah Jongg. Note this is NOT the tile-matching solitaire version of “Mahjong.” There are dozens of those, but only a relatively small number of American Mah Jongg apps. In our opinion (of course), the best American Mah Jongg apps are not completely free (except ours, not even any ads or limits). Mah Jongg is like the card game, Rummy, but uses tiles instead of cards. There are 3 tile suits: 1) bamboo (called bams), 2) characters (called craks), and 3) dots. The names describe the tile design (except the 1 bam tile has a bird design):



Figure 10. Bam Tiles (4 of each number) + green dragon, (4 of each green dragon).



Figure 11. Crak Tiles (4 of each number), + red dragon, (4 of each red dragon).



Figure 12. Dot Tiles (4 of each number), + white dragon (rectangle or zero design, 4 of each).

The 3 suits each have 10 tiles, the numbers 1 to 9 plus a dragon. The green dragon goes with bams, red dragon with craks, and white dragon (also called soap) goes with dots. To remember this: the main color in the bam tiles is green, the main color in the crak tiles is red, and the white dragon looks like a big dot. The white dragon can also be used as zero with any suit. There are 4 identical tiles of each number and 4 dragons in each suit.

There are 4 wind tile types, North, East, West, and South; with 4 identical tiles of each type:



Figure 13. Wind Tiles (4 of each).

There are eight flower and eight joker tiles. This totals 152 tiles. Jokers are used as wild “cards” in sets with three or more tiles.



Figure 14. Flower and Joker Tiles (8 of each).

Some Mah Jongg sets have different designs on each of the 8 flower tiles, but they are all interchangeable in American Mah Jongg. In addition to a flower (or some other design), the “flower” tiles often have a season (SPR=spring, for example) and a number. The season and number are **not** used in American Mah Jongg.

The object is to be the first of four players to complete a predefined winning pattern (also called hands) of 14 tiles. Completing a hand is called getting Mah Jongg. Winning American Mah Jongg hands are defined each year by the National Mah Jongg League and sold on copyrighted cards. Simple alternate custom cards (called Basic1, Basic2, and Inter1) are shown in [Appendix A](#) and can be used to play if you do not have an American Mah Jongg card. The 2025 American Mah Jongg League card defines 9 categories of winning hands:

- 1) Year (2025, for example)
- 2) 2468 (Even numbers)
- 3) Any Like Numbers
- 4) Quints (contain at least 1 set of 5 matching tiles – needs joker(s))
- 5) Consecutive Run
- 6) 13579 (Odd Numbers)
- 7) Winds - Dragons
- 8) 369
- 9) Singles and Pairs (**can't use jokers**)

Each category has a selection of 14-tile patterns that each define a winning Mah Jongg hand. Each hand has a base value that determines each player's score after someone completes a winning hand. The card also indicates if the hand is "Closed" (C) or "eXposed/Open" (X). Players cannot call a discarded tile for a closed hand unless it is the last tile needed (for Mah Jongg). The categories usually stay about the same from year to year.

The game has 2 sequential phases, 1) Charleston, and 2) Draw/Discard. A game starts with a Charleston phase where the players exchange up to 3 tiles at a time in up to 7 rounds. The Charleston is described in detail [here](#). After the Charleston, players take turns drawing and discarding a tile until someone calls Mah Jongg or no more tiles are left. No tiles left is called a "wall game" because the tile stacks drawn from are called walls. When this happens the game ends in a draw and no one scores. Players can call a discarded tile if it can be used to make a set of at least 3 matching tiles. Players can always call a tile (except jokers) if it is the last tile needed for Mah Jongg (one of the winning hands of 14 tiles). If a player successfully calls a tile, then it becomes that players turn and they receive the tile and expose it on the top of their rack with the matching tiles.

Other American Mah Jongg terminology you may see:

Pung - a set of 3 identical tiles e.g., 3 Red Dragons

Kong - a set of 4 identical tiles. e.g., 4 Eight Bams.

Special Winning Hands. If the East player is dealt a Mah Jongg hand on the first 14 tiles, this is called a Heavenly hand (scores double from all players). If East has Mah Jongg after the Charleston, this is called an Earthly hand (scores double from all players).

JLMahJongg App Description. JLMahJongg is an application (app) that enables 4 players to play in any combination of real and computer players (CPs). The app supports multiple real players playing on different devices over the Internet. It also enables up to two guests to watch and try to predict the winner. This is the "real" American Mah Jongg game, NOT the common tile matching solitaire game.

When run for the first time, the app sets default options for the skill level selected. You can change skill level or other setup (except card type) during a game by selecting "Main/Setup." See [Appendix C. Game Setup Options](#) for details about setup options.

Figure 15 shows an example initial display. There are 4 "Tile Rack" areas, one for each of the East, South, West, and North player positions. The current player's rack area is highlighted with a different color (default is green instead of blue). The bottom rack area is for the primary player (unless using "Auto Play" or the Demo, this is you, not a CP). All players are dealt 13 tiles and then East gets an extra 14th tile.

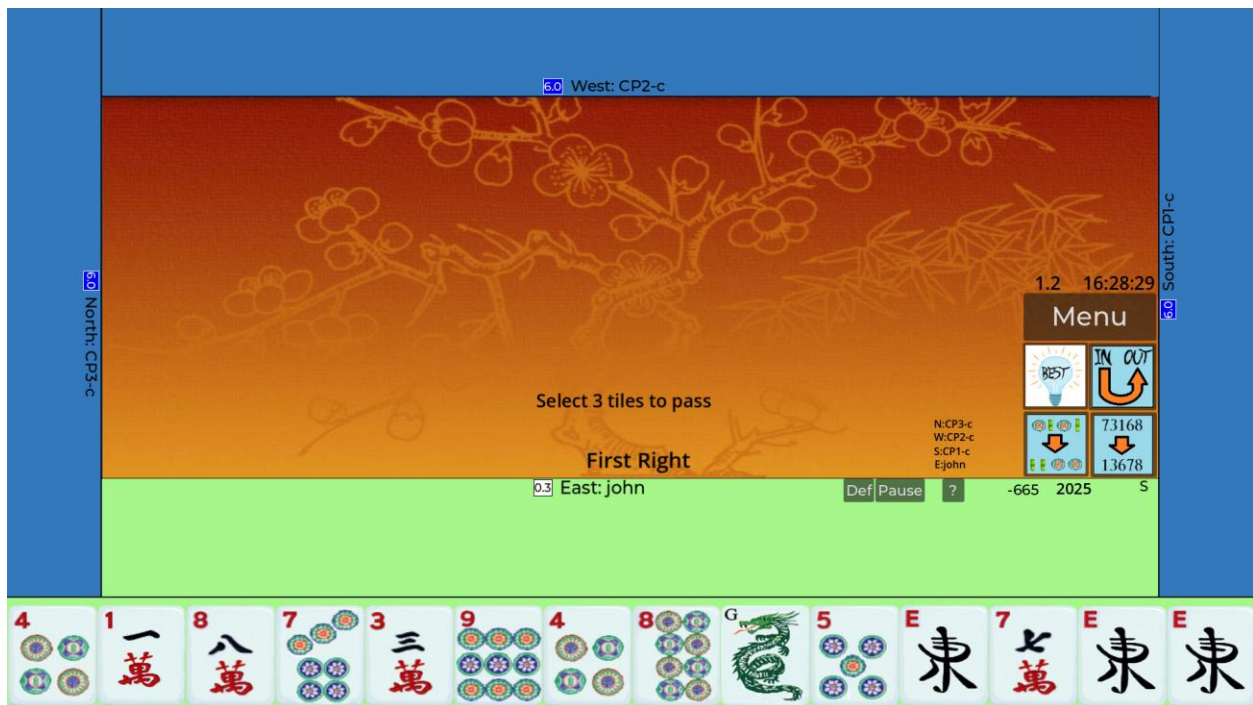


Figure 15. Starting Display Example (Table Type “Table 1”).

The white area shows discarded tiles and game messages. Text at the bottom of the discard area gives instructions. The first instruction is to select 3 tiles to pass in the first Charleston pass. Charleston is discussed in detail later.

Selecting Tiles. You select tiles you want to expose, pass, or discard. Click on or touch a tile to select it. To unselect, click on or touch it again. Selected tiles are outlined in blue. Tiles can also be selected by dragging them up. The number selected is shown next to a “Done” button. When the number of tiles needed to complete a turn are selected, either the “Done” button is shown or the tiles are immediately passed (if “Auto Done” is on). **In cases where the “Done” button is shown, it must be pressed to complete the turn and continue the game. If you select tiles before it is your turn, you will need to press “Done.”**

To prevent accidental selection and discard on touch screen devices, only the upper half of tiles can be touched to select them. To avoid accidental discard when moving tiles, drag the tiles using the bottom half of the tile. In other words, select on the top half and move by the bottom half. I also recommend only moving tiles when it is not your turn to avoid accidentally discarding them.

There is also a button labeled “SP,” **Select Passed**, that selects the tiles just passed. The “SP” button is only shown when a “Hint” hand is not displayed. To show a “Hint” hand,

press the “H” or “Hint” button. Tiles just passed or drawn will be highlighted in green. Note that tiles are not selected until they are highlighted in blue, not green.

Display Buttons and Menu Options: Buttons along the bottom or center are used to control game play. The primary player presses the “Done” button, if necessary, to end their turn. It may not be necessary to press “Done” if “Auto Done” is enabled. Even with “Auto Done” enabled, if you select a tile before your turn, you will have to press “Done.”

The “S” button sorts tiles by suit and the “L” button sorts tiles by like numbers.

Pressing the “Menu” button pops up the main menu. The options available depend on the help level chosen. The Menu options for the “All” help level are:

- Setup (O) – Returns to Setup (Options) display (pauses game)
- Best Categories (C) – Shows the “Best Categories” popup
- Scores – Shows the scores of any previous games and best/record scores
- Toggle Voice (V) – Toggles voice on and off (mute)
- Save Game/Setup – Saves the current game and returns to the Setup display (single player games only)
- Defense (D) – Shows opponent’s likely hands and tiles needed (described in [Appendix B](#))
- Freeze – Keeps the recommended hand frozen, if possible. Only changes hands if the current recommended hand is not in the top hands stored. Unfreeze by selecting “Hint” again. Can also freeze by selecting the 1st tile in a hand from the “Best Hands” or “Best Categories” lists.
- Toggle Skip – Turns the [auto-skip](#) feature on and off during a game. Auto-skip is most useful for fast-playing Intermediate and Pro players selecting their hand manually.
- View Card/Wins – Displays the current card with number of wins for each line in a popup window (Note: does not display standard NMJL cards unless they have been entered using the card editor).
- Call Dead – Call another player’s hand dead.
- Quit (Q) – Quits the game (if the app does not quit try <cntrl>Q).
- Clear (Space) – used to clear all tile selections, hint display, or the winning hand display at the end of a game (so you can see remain tiles in the wall).
- Win History – pops up the most recent hands won and the number of times each hand was won.

The other two help levels, “Basic” and “None,” eliminate some options. The letters in parentheses can be used as shortcuts if a keyboard is available and if chat is not active. The space bar performs “Clear” and the enter key performs “Done.”

Charleston: The game starts with up to 7 rounds of tile exchanges between players called the Charleston. There are one or two sets of three exchange rounds between players and a “Courtesy” round where tiles can be exchanged with the player across from you. The first round is called “First Right” where each player selects and passes 3 tiles to the player on their right (counterclockwise). For example, East passes 3 tiles to the South position, South passes to West, etc. The next round is called “First Across” where 3 tiles are passed between East and West and 3 tiles are passed between North and South. West is across from East. North is across from South. The last of the first set of rounds is “First Left” where, you guessed it, up to 3 tiles are passed to the left. Note I said **up to** 3 tiles. In the First Left round, you can borrow (also called blind pass or stealing) up to 3 tiles that would be passed to you and pass those tiles instead of tiles from your hand. You **can’t** look at the tiles you borrow to pass. You blind pass if you don’t have 3 or more tiles you can live without. The game handles passing borrowed tiles so you don’t have to do anything special; however, you may need to hit done to complete this round because the computer doesn’t know how many tiles you want to borrow. If “Auto Done” is set, the turn is automatically completed after the number of tiles the across player wants are selected.

After “First Left” (end of first set of 3 rounds) and before “Second Left,” any player can request to stop the Charleston. If this happens, the second set of Charleston exchanges are skipped, and play continues with the Courtesy round.

If not stopped, the next set of 3 Charleston rounds are like the first three, except in the opposite (clockwise) direction starting with “Second Left.” After “Second Left” are “Second Across” and “Last Right.” As in “First Left,” players can borrow up to 3 tiles to pass in the “Last Right” round.

The last exchange is called “Courtesy” or “Optional Courtesy.” Each player chooses up to 3 tiles to pass to the across player. The players exchange the minimum number of tiles the two players want to pass. If the across player wants fewer tiles than you have selected, a message will be displayed to select the number of tiles the other player wants (if any).

I know this sounds complicated, but it is easy once you play a few times. The remaining game play is relatively simple and consists of drawing and discarding tiles. East already has an extra tile (14 tiles), so East discards first.

Draw and Discard Play: Figure 7 (Table Type “Table 1”) is an example display during Draw and Discard. The other players can call a discarded tile if they can use it in an open

hand using 3 or more matching tiles. If a tile is called, that tile and the matching tiles are shown on the top rack. The discarded tile can always be called for Mah Jongg, even if for a closed hand and/or if needed for less than a set of 3 matching tiles; however, jokers can **never** be called, even for Mah Jongg (technically unless called incorrectly, but the app should not call any tiles incorrectly). If multiple players want a discarded tile, priority goes to the player closest counterclockwise from the discarding player (the player whose turn is next has highest priority). Priority continues counterclockwise. If a player calls a tile for Mah Jongg, this takes priority over a player just calling the tile.

The last discarded tile and who discarded it are shown at the lower left side of the white discard area in Figure 7 (Table Type “Table 1”). The number of tiles left (in the wall to draw) is shown to the right of the discarded tile. If you don’t call the tile before the next player draws and places the tile on their rack, then you can’t call the tile. The time you have to “Hold” or “Call” is determined by the setup parameter, “Discard Pause.” The hold time left is counted down and shown next to the “Hold” button. If Hold is set by pressing the “Hold” button, then “MahJongg” and/or “Call” and “Skip” buttons will be shown.

The discarded tiles are shown in a random order in the white area. This simulates a game with real tiles where players discard the tiles to a random table location. You can see what tiles have been discarded, but it is difficult to remember who discarded them. When the game is completed, after a blank tile space, any remaining tiles are displayed in the order they would have been drawn. To hide the winning hand box and see all the tiles, select clear from the Menu or press the space bar.



Figure 7. Discarding Tiles and Holding (Table Type “Table 1”).

If there is only one choice, tiles are selected and exposed automatically. Tiles will also be selected automatically if you are showing a goal hand (Hint). Otherwise, you need to manually select tiles to show along with the called tile and then press “Done.” Depending on the settings, the app may automatically call Mah Jongg or warn you if you can call a tile for Mah Jongg.

You need at least 2 more of the discard tile to call unless for Mah Jongg.
Press close to close this window & cancel to cancel the call.
Runs (123), 2025, and NEWS are all singles and can only be called for Mah Jongg.

If you can select a tile, but it is still not a valid call (single or pair not for Mah Jongg), then you will also get the warning message shown in Figure 7b (right of the Mah Jongg button).

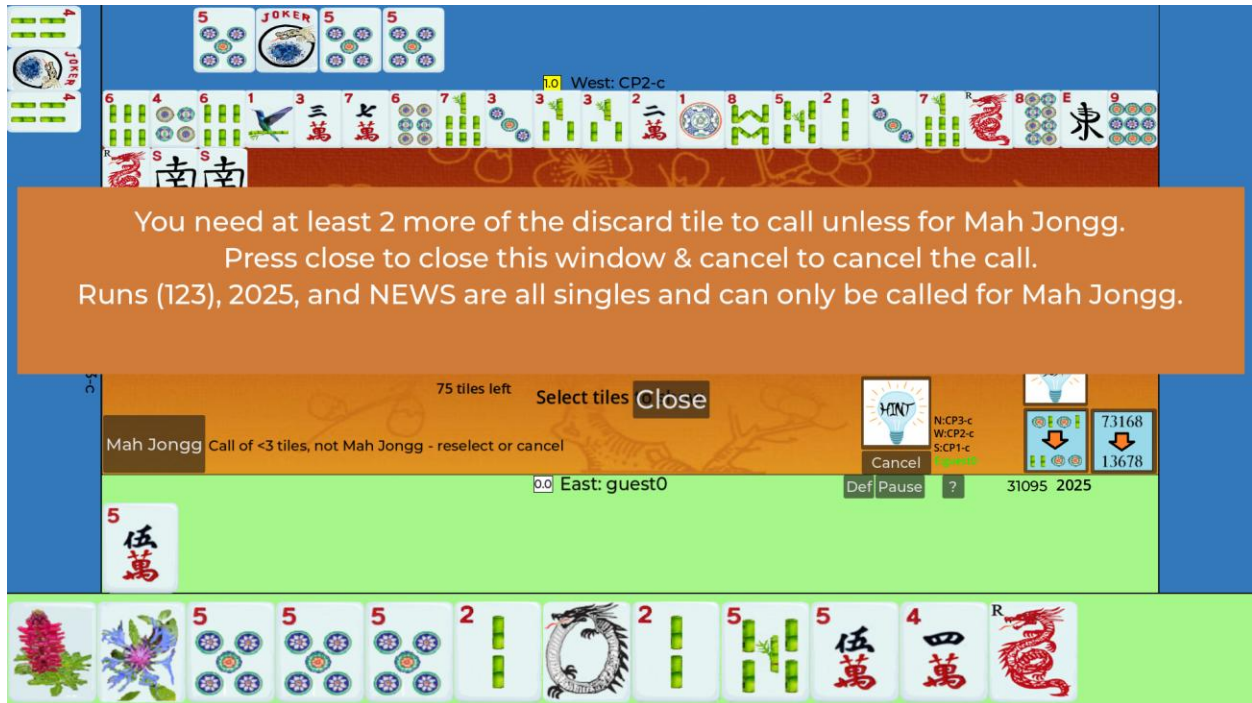


Figure 7b. Trying to call a tile you can't call. You will need to press the "Cancel" button under the "Hint" button. Also press the close button to hide the message window.

Using Jokers: Jokers can be used to make any set of three or more tiles. There is no limit to the number of jokers you can use. Jokers can **never** be called or be used for a set of only one or two tiles (singles and pairs). **Never** also means not even for Mah Jongg. Jokers are always safe to discard. This also means "Singles and Pairs" hands can never use jokers. This is part of the reason singles and pairs hands are higher value (harder). Each hand's base value is shown on the card. You also can't call a tile for any "Singles and Pairs" hand unless it is the last tile needed for Mah Jongg (you always need at least 3 in a set to call a tile unless for Mah Jongg). On a touch screen device and using Auto-Done, be careful not to accidentally discard a joker by touching it. The game may require you to hit the "Done" button if you want to discard a joker.

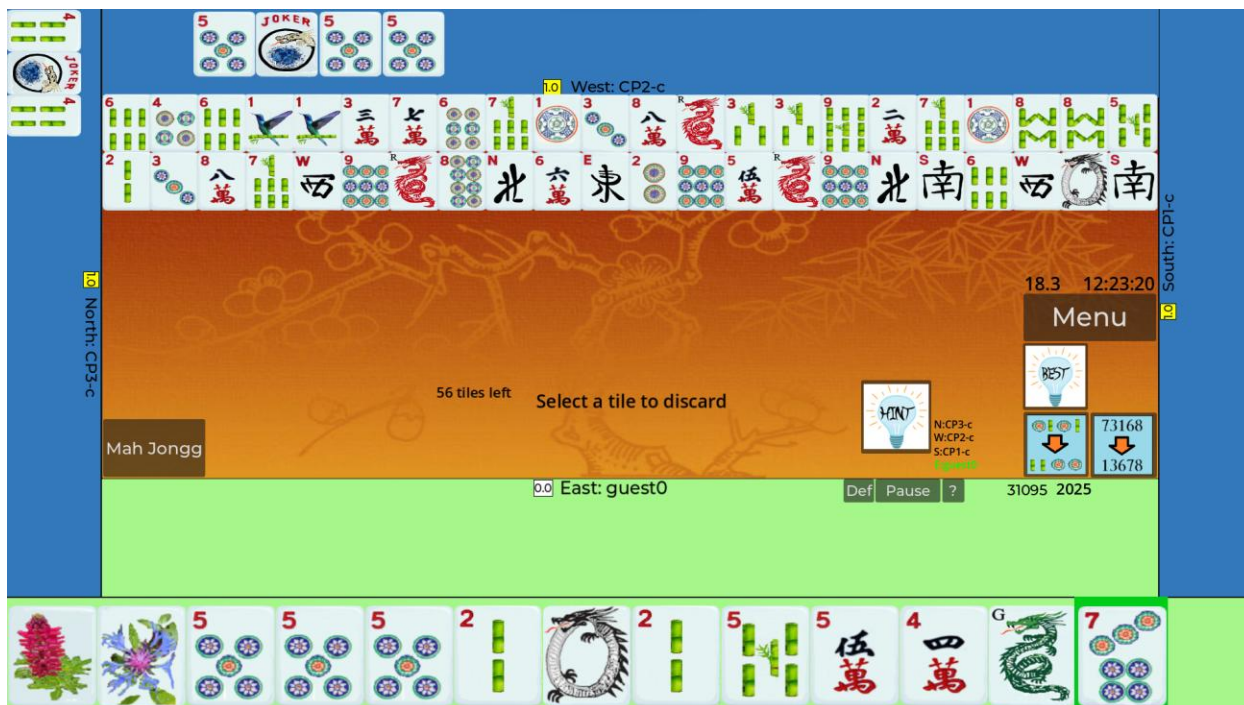


Figure 8. Example with 5 dot and 4 bam sets called and shown with Jokers (Table Type “Table 1”).

Exhanging for Jokers: Jokers that are exposed (shown) can be exchanged for the tile they represent by players during their turn. A player’s turn starts when they draw or successfully call a tile. The turn ends when they discard a tile or call Mah Jongg. A joker can be stolen if you have the tile it is being used as. For example, in Figure 8 (Table Type “Table 1”) someone could exchange for an exposed joker during their turn if they have a 4 bam or 5 dot tile. You can, and usually should, exchange your own jokers. You can exchange as many Jokers as you can on the same turn. The primary player can exchange a joker when they have the matching tile by clicking on the joker to be exchanged for (or touch it on a touch screen). The game does not tell you if there is a joker you can get. Hovering the mouse on a joker shows how it is being used. On touch displays, touching a joker shows how it is being used. To show the joker again, touch somewhere else on the display.

If you exchange for a joker as the last move before declaring Mah Jongg, this is called a “Finesse.” A Finesse is considered self-picked and scores double from all players, even if you called a tile to start this last turn. Yes, this is an official NMJL rule (Mah Jongg Made Easy 2024, pg 23, Ruling 7.)

Scoring: The player can press the Mah Jongg button when they have Mah Jongg or are calling a tile for Mah Jongg. The app may call Mah Jongg for you. The app may also show a green MahJongg button if you have Mah Jongg or can call a tile for Mah Jongg. If you have Mah Jongg, press the MahJongg button to declare it (no discard is needed).

After a player calls Mah Jongg, all players' hands and text indicating the hand they were trying to make are shown. Each player's score is also shown. Hands without a joker (except singles and pairs) score double the card's base value for that hand from all players. A player that draws the Mah Jongg tile rather than calling it, also scores double from all players. Otherwise, only the player that discarded the tile called for Mah Jongg loses double (only exception is Finesse described above). The game also keeps track of the primary player's highest score ever received in a single game and the total accumulated score across games. If the tiles run out before anyone calls Mah Jongg, it is called a "wall game" and nobody scores.

Total Score: The total accumulated score across games is separate from the scores in a particular game and is called Total Score. This Total Score depends on the player skill level and the amount of automated help used in the games. If a player uses more than the default level of help in a game, the player can no longer add to their Total Score if they win. However, they can still decrease their Total Score if they lose. The purpose of this is to encourage players at higher skill levels to use less automated help. Pro players can't add to their Total Score if they use any help features. Intermediate players can't add to their Total Score if they use the Hint feature. Beginners can always add to their Total Score. If one of the main help features has been used an (H) is shown near the player's game score. The (H) will turn red if excess help has been used and Total Score can't be increased for that game.

To make sure the scores are fair, you only increase your score or record "Record" scores if the "Game Type" is set to "Record" and you are not using your own custom card. Records are kept for the last: 1) Singles and Pairs win, 2) Quints win, 3) Closed hand win, 4) Jokerless win. When "Record" is "On" you lose 25 points if you quit or restart another game in the middle of a game. If you want to quit or restart in the middle of a game without losing points (for testing, for example), set "Record" to "Off."

The following special wins are considered "self-picked" and score double from all players:

1. Heavenly Hand - If East has Mah Jongg at the beginning of the Charleston, this is called a Heavenly Hand.
2. Earthly Hand - If East has Mah Jongg immediately after the Charleston, this is called an Earthly Hand.
3. Finesse - A Finesse is when you call a tile, expose the set containing it, and then exchange for a Joker to get Mah Jongg.

Error Handling and Dead Hands: Possible player errors include: 1) trying to call a tile when you can't or 2) calling Mah Jongg when you don't have it. If you try to call a tile

for a set that is less than 3 tiles and not for Mah Jongg, the app will let you re-select or cancel the call. If you call a tile for a set with at least 3 tiles, once you hit done and the set is shown, you can't cancel the call. If the set is not contained within one of the winning hands, then you can't win and your hand will be called "Dead." Your hand will also be "Dead" if you call Mah Jongg when you don't have it. Once a player's hand is called dead, they no longer play and the game continues with the remaining players.

Computer players (CP) can call your hand dead if the game setting "Dead Calls" to "On" and the CP defense level is above "None." Other real players can still call your hand dead. Unlike the official rules (that don't make sense to me), who wins the "Dead Call" bet is decided at the time the dead call is made. The app knows if your hand is really dead or not. If your hand is dead, then the app declares that. You don't lose any extra points other than what you would normally lose at the game end. If your hand is not dead, the person calling it dead loses 50 points to you.

The real NMJI rule is that calling someone's hand dead is considered a bet that is placed between the 2 (or more?) players involved. If you admit your hand is dead, you stop playing and don't lose any extra points. If you don't admit you are dead, you can continue playing and the bet is decided at the end of the game. Whoever wins the bet at that point pays the other player(s) 50 pts. I don't know how you can know or remember if/why the person's hand was dead at the point of the game when called dead if the declaration is not very close to the game end. The person who did not admit they were dead is not going to admit it at the end either. You could go by if the hand is dead at the end, but they could have still been alive at the point the hand was called dead. I have seen someone recommend taking pictures of the tiles at the time of the dead call.

If a player calls a set that makes their hand dead, the incorrect set is returned to the player's hidden rack (including any jokers in the set). The dead hand player keeps the called tile and does not discard. The play continues with the next player in counterclockwise order after the dead hand player. Any jokers from previous sets shown by the dead hand player can still be stolen by the remaining players.

Figure 9 (Table Type "Table 2") shows a game-end display where the computer player (named CP3-c) in the North position won.



Figure 9. Winning Format Example (Table Type “Table 2”).

Differences Playing with Real Tiles: When playing with real tiles, the main differences are at the start of the game. With real tiles, the tiles are shuffled on the table and stacked in four “walls” of 19 pairs of tiles, face down, in front of each position. Player East rolls the dice and the total number thrown designates where East breaks their wall. East deals tiles face down to each player starting with herself/himself and dealing stacks of 4 tiles at a time counterclockwise to each player. When East’s wall has been depleted, the wall to the left is pushed out. After dealing 3 sets of 4 tiles to each player (12 tiles), East deals herself/himself the next tile (top of first stack) and the top tile on the 3rd remaining stack (called tiles 1 and 3). Each of the other players then draw in order a 13th tile. East will have 14 tiles (enough for Mah Jongg) and the other players will have 13 tiles. The rest of the game is the same as described for the JLMahJongg app.

Training Display: A “Training” display feature can be selected from the lobby menu button at the lower right called “Training.” This display can show random hands for you to evaluate and compare with what the computer would recommend doing. You can also enter any specific set of 13 or 14 tiles and view what hands are recommended and what tiles are best to pass. This display can also be used to enter a specific hand you receive when playing with a real tile set to see what the computer would have recommended. A training display example is shown in Figure 10. The tiles on the upper part of the display can be selected to form any specific set of tiles to evaluate.

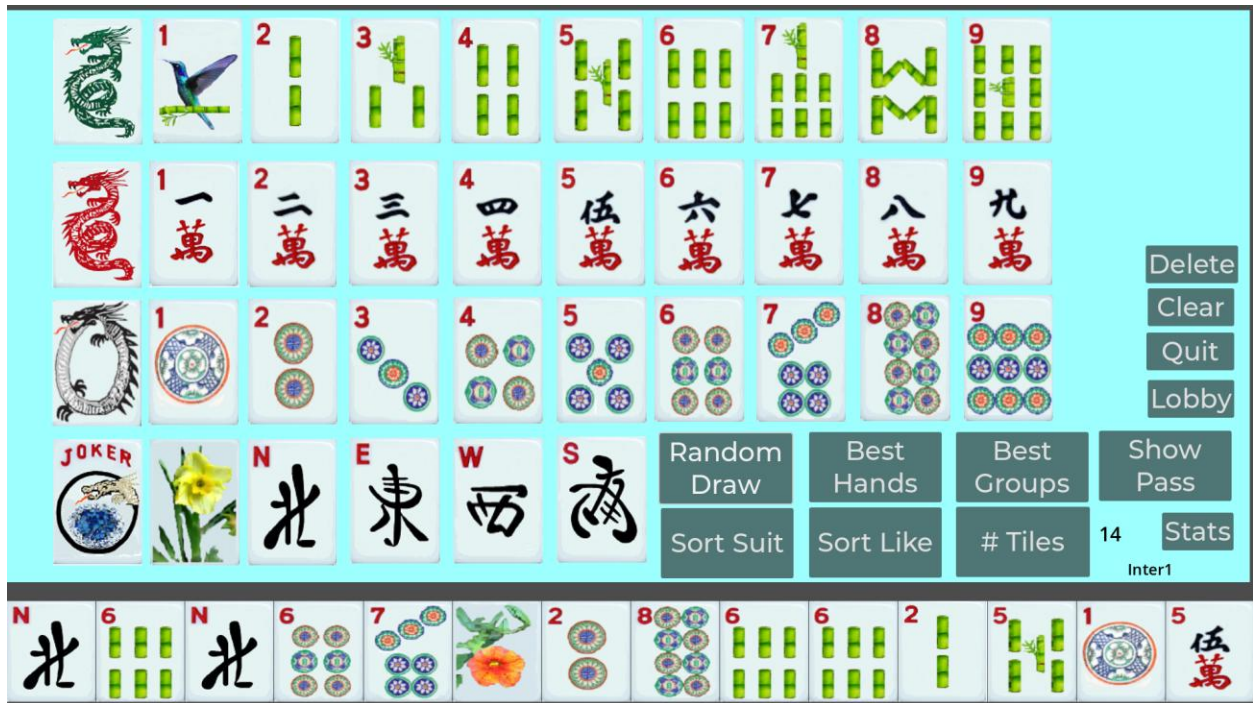


Figure 10. Training Display Example with Random Tiles at the Bottom.

Installation and Compatibility:

The online (browser) version of JLMahJongg uses the latest Godot game engine (4.6 at time of writing). Most game functionality is the same as in the downloadable app.

The online browser versions also can't upload custom tile images. You need to download the native app to get this functionality (custom tile addition is only available by request and on approval).

Single Player Browser App: The JLMahJongg browser app has been tested in Chrome, Safari, and Edge browsers. Also, preliminary testing has been done using Firefox, Opera, Brave, and Vivaldi browsers. When running in a browser you should switch to full screen if it does not start in full screen mode. Switch to full screen in Chrome by selecting the 3 vertical dots in the upper right and then select the full screen box button near the zoom button. To exit full screen on a PC hit the F11 key.

On small devices (phones), there is usually a way (that is not obvious) to start the browser app full screen. This usually involves installing the browser page to start like an app.

The browser version has worked on all devices except some older iPads. It has been tested on a MacBook and on a 5th gen iPad Pro with 512GB of memory using iPadOS (iOS) 15.7.1 and both the Safari browser and Chrome version 107.0.5304.101. The JLMahJongg browser app requires about 27Mbytes of memory. It may work on a ChromeBook (tested and sometimes did work and sometimes didn't).

The browser version will also work on an Android phone or iPhone. After loading into Chrome, select "Add to Home screen" under the vertical 3 dots pull-down at the upper right. Running it from the screen link will then open it in full screen mode. Phone screens are small, but Table Type "Table 1" might be usable since it has everything as large as possible. Every different device and browser will keep separate track of the stored player profiles.

Note that in the browser game versions, selecting quit will end the game but the display window needs to be closed manually. Or you can just close the display window manually to end the game. Also note that Apple mobile devices (iOS) do not support a quit function from any app, so selecting quit brings you back to the setup/lobby screen. To stop the app on an iPad, swipe up from the lower edge to show running apps and then swipe the app off the page to stop it.

Multiplayer App: The multiplayer app must be run on each real player's device as a native app, not in a browser window. Also, each player must be logged into a different account. The JLMahJongg multiplayer app is available for Windows, OSX (Mac and MacBook), iOS (iPad and iPhone), Android, and Linux. Mobile versions (iPad, iPhone,

and Android) are normally installed from an internet store (for example: Apple App Store, Google Play, or Amazon App Store). JLMahJongg is available on the Apple App Store. I can also upload it to an iPad or iPhone with a physical connection to the lightning or USB C port. JLMahJongg does not work on iPhones older than 11.

Note that Apple devices can't currently record custom voices because iOS and macOS audio recording is not supported in the game engine (Godot). This may be fixed in the future.

Strategy Suggestions:

1. It helps to decide what category and hand you are trying to make as soon as possible.
2. Try to keep tiles that you have multiple of the same tile. Even if they are not used in your hand, they may be exchanged for a joker if someone calls the tile you discard. Pairs are generally hard to make so value them appropriately.
3. Try not to pass multiple tiles that can easily be used together to the same opponent during the Charleston. For example, don't pass multiple of the same tile or multiple winds.
4. If you can't throw out a tile because you know someone needs it for Mah Jongg, try to switch to a hand that uses the tiles you can't discard (not always possible).
5. It is risky discarding flowers near the end of the game. If you have a low chance of winning, discard jokers or other tiles that you know can't be used.
6. During the Charleston passes, you often see the same tiles you saw in earlier passes. Consider changing your hand based on the tiles that are being passed. Try to determine what others are making based on what they pass you. It helps to be making something in a category that nobody else is targeting.
7. Don't be too quick to call a discard and give away your hand in the early part of the game. Calling early will limit your options and show others what you are doing. Often there will be more chances later. Also calling tiles gives you fewer chances to draw a high value tile (joker or flower) from the wall. The computer players do not follow this advice.
8. Try to save your jokers for later in the game. Early joker exposing gives others more chance to take them.
9. Avoid focusing on a hand where you need to complete single(s) or pair(s). Make sure you can switch to another easier hand if you don't get lucky with the draws.
10. The consecutive run category often has hands with the best odds. This is because there are far more consecutive run hands than in any other category.

Have Fun!

Appendix A. JLMahJongg Cards

This appendix provides sample custom cards, called Basic1, Basic2, and Inter1, with hands that let you play JLMahJongg. If you don't have a standard National Mah Jongg League, Inc. (NMJL) card nationalmahjonggleague.org, you can use the Basic1 or any other custom JLMahJongg card available from the "Card Type" Menu. A 2025 card option is available in JLMahJongg. However; due to copyright restrictions, an NMJL card can't be viewed in the app unless you enter it yourself using the card editor.

If desired, a relatively-simple Basic1 card can be selected using the Card Type button. The Basic1 format and categories are like those on an NMJL card (only 7 instead of 9 to 10 categories).

You can also enter any custom card using the JLMahJongg "Card Editor."

Card Format: Each card line defines tile patterns of Mah Jongg-winning sets of 14 tiles. Each line has several tile sets (groups of the same tile) that are shown in the same color: blue, green, or red. A set can contain 1 (called a single), 2 (called a pair), or more tiles. All the tiles in a set are the same (note that N E W S is four sets of 1 tile each, **not** a set of 4 winds). Sets of 3 or more can include jokers (can be all jokers).

When sets need to be different suits (suits are dots, bams and craks), they are usually shown in different colors. Note that winds and flowers don't have a suit, and they are typically shown in blue.

D's are dragons. White dragons (Soap) are suit dots, green dragons are suit bams, and red dragons are suit craks. N is North wind, E is East wind, W is West wind, and S is South wind. F is a flower.

In the Like Numbers and Winds/Dragons categories, 1111 means any four numbers that are the same (from 1 to 9). In Consecutive Numbers and Singles/Pairs categories, "1111 2222" can be "1111 2222" or "2222 3333" or "3333 4444", or any two consecutive numbers.

While not used in the Basic1 card: G=green dragon, R=Red dragon, and O=white dragon used as a single tile set of the number zero (for year categories). Standard National Mah Jongg League year category sets, such as 2022, are 4 singles (2, O, 2, and 2). Also, Singles and Pairs category patterns with multiple different numbers together look like a single set, but are multiple sets of all singles and/or pairs.

At the right of each line, an "X" means the hand is open (also called eXposed) and you can call tiles for sets of 3 or more tiles or for Mah Jongg. A "**C**" means the hand is closed and you can only call a non-joker tile if it is the last tile needed for Mah Jongg. The

number at the right of the line is the base value for scoring a winning hand (see the scoring section for details: [Scoring](#)).

Basic1 Mah Jongg Card

			VALUES
Group 1: 2468 (Even Numbers)			
Line 1:FF 222 444 666 888	(any 1 suit)		X 25
Line 2:222 4444 666 8888	(any 2 suits)		X 25
Line 3:22 444 66 888 DDDD	(any 3 suits)		X 30
Group 2: Like Numbers			
Line 1:FF 1111 N E W S DDDD	(any 1 suit, matching Dragons)		X 25
Line 2:FF 1111 N E W S 1111	(any 2 suits)		X 25
Line 3:FF 1111 1111 1111	(3 suits)		X 25
Group 3: Consecutive Run			
Line 1:111 222 333 44 DDD	(any 1 suit, any 4 cons. #'s, matching Dragons)	X 25	
Line 2:111 2222 333 4444	(any 2 suits, any 4 consecutive #'s)	X 25	
Line 3:FFF 1111 2222 333	(3 suits, any 3 consecutive #'s)	X 25	
Group 4: 13579 (Odd Numbers)			
Line 1:11 333 5555 777 99	(any 1 suit)		X 25
Line 2:11 333 55 55 777 99	(any 2 suits)		X 25
Line 3:FF 111 33 55 77 999	(3 suits)		X 30
Group 5: Winds/Dragons			
Line 1: NNNN EEEE WWWW SS			X 25
Line 2:FF 111 DDD DDD DDD	(any No., 3 dragon sets, 3 suits)		X 25
Line 3:FFFF EEE 1111 WWW	(any No., any 1 suit)		X 25
Line 4:FFF DDDD DDD DDDD	(3 suits)		X 25
Line 5:FF NNN EEE WWW SSS			C 30
Group 6: 369			
Line 1:FFF 333 6666 9999	(any 1 suit)		X 25
Line 2:333 6666 666 9999	(any 2 suits)		X 25
Line 3:FF 333 666 999 DDD	(any 1 suit, matching Dragons)		X 25
Group 7: Singles & Pairs			
Line 1:FF 11 22 33 44 55 66	(any 1 suit, any 6 consecutive #'s)		C 50
Line 2:NN 11 22 33 44 55 66	(any 1 suit & North, any 6 consecutive #'s)		C 50
Line 3:SS 11 22 33 44 55 66	(any 1 suit & South, any 6 consecutive #'s)		C 50
Line 4:DD 11 22 33 44 55 66	(any 1 suit, any 6 cons. #'s, matching Dragon)		C 50

Basic2 Mah Jongg Card

Group 1: 2468 (Even Numbers)			VALUES
Line 1: FFF 22 44 666 8888	(any 1 suit)		X 25
Line 2: 22 444 44 666 8888	(any 3 suits)		X 25
Line 3: 22 444 DDDD 666 88	(any 1 suit)		X 25
Line 4: FF 222 444 666 888	(any 2 suits)		C 30
Group 2: Like Numbers			
Line 1: 111 DDDD 111 DDDD	(any 2 suits, matching Dragons)		X 25
Line 2: FFF 1111 DDD 1111	(any 3 suits)		X 25
Line 3: FFFF 111 1111 111	(3 suits)		X 25
Line 4: FF 111 D 111 D 111 D	(3 suits)		C 30
Group 3: Consecutive Run			
Line 1: 111 2222 333 DDDD	(any 1 suit, any 3 cons. #'s, matching Dragons)		X 25
Line 2: 111 222 3333 4444	(any 2 suits, any 4 consecutive #'s)		X 25
Line 3: FF 1111 2222 3333	(3 suits, any 3 consecutive #'s)		X 25
Line 4: FFFF 111 222 3333	(any 1 suit, any 3 cons. #'s)		X 25
Group 4: 13579 (Odd Numbers)			
Line 1: 111 333 555 777 99	(any 1 suit)		X 25
Line 2: 111 333 55 777 999	(3 suits)		X 25
Line 3: 1111 33 55 77 9999	(any 2 suits)		X 30
Line 4: 111 3 555 555 7 999	(any 2 suits)		C 30
Group 5: Winds/Dragons			
Line 1: NNNN EEE WWW SSSS			X 25
Line 2: NNNN SSSS DDD DDD	(any 2 Dragons)		X 25
Line 3: EEEE WWWW DDD DDD	(any 2 Dragons)		X 25
Line 4: FFFF DDD DDDD DDD	(any 3 Dragons)		X 25
Line 5: FF NNN 111 222 SSS	(any 2 suits, any 2 cons. #'s)		X 25
Group 6: 369			
Line 1: FF 3333 6666 9999	(any 1 suit)		X 25
Line 2: 3333 666 9999 DDD	(any 2 suits, 6's and Dragons match)		X 25
Line 3: 3333 6666 999 999	(any 3 suits)		X 25
Line 4: 333 666 333 666 99	(any 3 suits)		C 30
Group 7: Singles & Pairs			
Line 1: FF 11 22 11 22 11 22	(3 suits, any 2 consecutive #'s)		C 50
Line 2: FF 33 66 99 33 66 99	(any 2 suits)		C 50
Line 3: 11 22 33 44 55 66 77	(any 1 suit, any 7 consecutive #'s)		C 50
Line 4: FF 11 22 33 44 55 DD	(any 1 suit, any 5 cons. #'s, matching Dragon)		C 50

Intermediate (Inter1) Mah Jongg Card

Group 1: 2025			VALUES
Line 1: 222 2025 0000 555	(any 1 suit)		X 25
Line 2: FFFF DDD 2025 DDD	(any 3 suits)		X 25
Line 3: FFFF 2025 222 555	(any 3 suits)		X 25
Line 4: 22 000 NEWS 222 55	(any 2 suits)		C 30
Group 2: 2468 (Even Numbers)			
Line 1: FFFF 2222 46 8888	(any 1 suit)		X 25
Line 2: 222 888 DDDD DDDD	(any 3 suits)		X 25
Line 3: 222 4444 666 8888 -or- 222 4444 666 8888	(any 1 or 2 suits)		x 25
Line 4: 2222 44 6666 88 88	(any 3 suits)		X 25
Line 5: 222 44 666 888 888	(any 3 suits)		C 30
Group 3: Like Numbers			
Line 1: DD 1111 N E W S 1111	(any 3 suits)		X 25
Line 2: FF 1111 DD 1111 DD	(any 2 suits)		X 25
Line 3: FFFF 1111 11 1111	(any 3 suits)		X 25
Line 4: 11 DD 111 DDD 11 DD	(any 3 suits)		C 30
Group 4: Consecutive Run			
Line 1: 11 222 3333 444 55 -or- 55 666 7777 888 99	(these #'s only)		X 25
Line 2: FFFF 11 222 11 222	(any 2 suits, any 2 cons. #'s)		X 25
Line 3: FFF 1111 2222 DDD	(any 3 suits, any 2 cons. #'s)		X 25
Line 4: FFFF 1111 2222 DD	(any 1 suit, any 2 cons. #'s)		X 25
Line 5: 111 222 111 222 33	(any 3 suits, any 3 cons. #'s)		C 30
Group 5: 13579 (Odd Numbers)			
Line 1: 11 333 5555 777 99 -or- 11 333 5555 777 99	(any 1 or 3 suits)		X 25
Line 2: 111 3333 333 5555 -or- 555 7777 777 9999	(any 2 suits)		X 25
Line 3: FFFF 1111 33 5555 -or- FFFF 5555 77 9999	(any 1 suit)		X 25
Line 4: 1111 333 5555 DDD -or- 5555 777 9999 DDD	(any 1 suit)		X 25
Line 5: 111 3 555 555 7 999	(any 2 suits)		C 30
Group 6: Winds/Dragons			
Line 1: FF NNN EEE WWW SSS			X 25
Line 2: FFF NNNN DDD SSSS	(Dragons any suit)		X 25
Line 3: FFFF EEE 1111 WWW	(any No.)		X 25
Line 4: NNN 1111 2222 SSS -or- EEE 1111 2222 WWW	(any 2 suits, any 2 cons. #'s)		X 25
Line 5: FF DDDD DDDD DDDD			C 30
Group 7: 369			
Line 1: 33 66 333 666 9999	(any 3 suits)		X 25
Line 2: 33 666 66 999 DDDD	(any 3 suits)		X 25
Line 3: FFF 3333 666 9999 -or- FFF 3333 666 9999	(any 1 or 3 suits)		X 25
Line 4: FF 333 666 999 999	(any 3 suits)		X 25
Line 5: 333 6 999 333 6 999	(any 2 suits)		C 30
Group 8: Singles & Pairs			
Line 1: NN EE WW SS 11 22 33	(any 1 suit, any 3 cons. #'s)		C 50
Line 2: FF 11 33 55 55 77 99	(any 2 suits)		C 50
Line 3: FF 33 66 99 33 66 99	(any 2 suits)		C 50
Line 4: FF 11 22 DD 11 22 DD	(any 2 suits, any 2 cons. #'s)		C 50

Appendix B. Help Features

B.1 Offensive Help

Offensive help includes hand hints and the tile status display.

The “Hint” or “H” button shows a recommended “goal” hand in the bottom row (Figure B1). These 14 “goal” tiles should not be confused with the 13 or 14 tiles in the player’s hand. Table Type “Table 1” does not have the extra row to show the goal hand, but can show the goal hand and actual hand together. This is done by white (open), yellow (need a joker), or red (closed) shading over missing goal tiles to distinguish them from your current tiles (Figure B2). In Table Type “Table 2”, when sorted by a specific hand, tiles matching a goal hand are shown above it and any remaining unmatched tiles are shown at the top right. In Table Type “Table 2”, the top two rows show the player’s tiles and the bottom row shows the recommended goal hand.

It is recommended to resist using the “Hint,” “Best Hands,” “Best Groups,” and “Ranks” features and decide for yourself what hand to make and which tiles to pass or call. This develops the skills needed to play without help. However, the game can be played much faster when using the automated aids. These aids can also help you learn by comparing what you would do with what the computer would do.

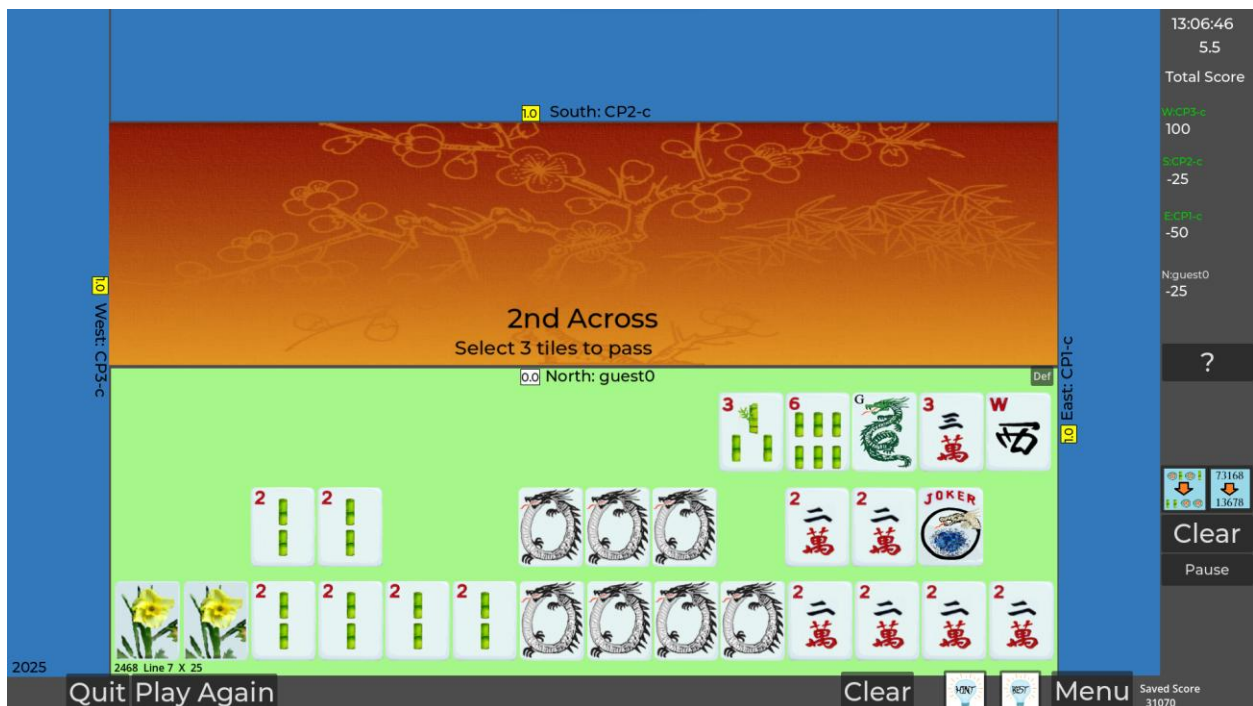


Figure B1. *Sorting by Recommended Hand - Tiles are sorted against a Recommended*

“Goal” Hand shown in the bottom row when “Hint” or “H” is pressed, Table Type “Table 2”.

The same recommended hand and sorted tiles are shown for Table Type “Table 1” in Figure B2. This shows the same information in a more compact form. The recommended-hand tiles you **have** are shown unshaded at the bottom. Tiles you **don’t have** and need are shaded in white for an open hand if the tile is still available and in yellow if it needs to be a joker. Closed hand tiles are shaded in red. In all Table Types, top row tiles to the right are those in your rack but not exposed (shown) and not used in the recommended hand. Shown (or eXposed) tiles are on the left of the top row on a black background (none in Figure B2).

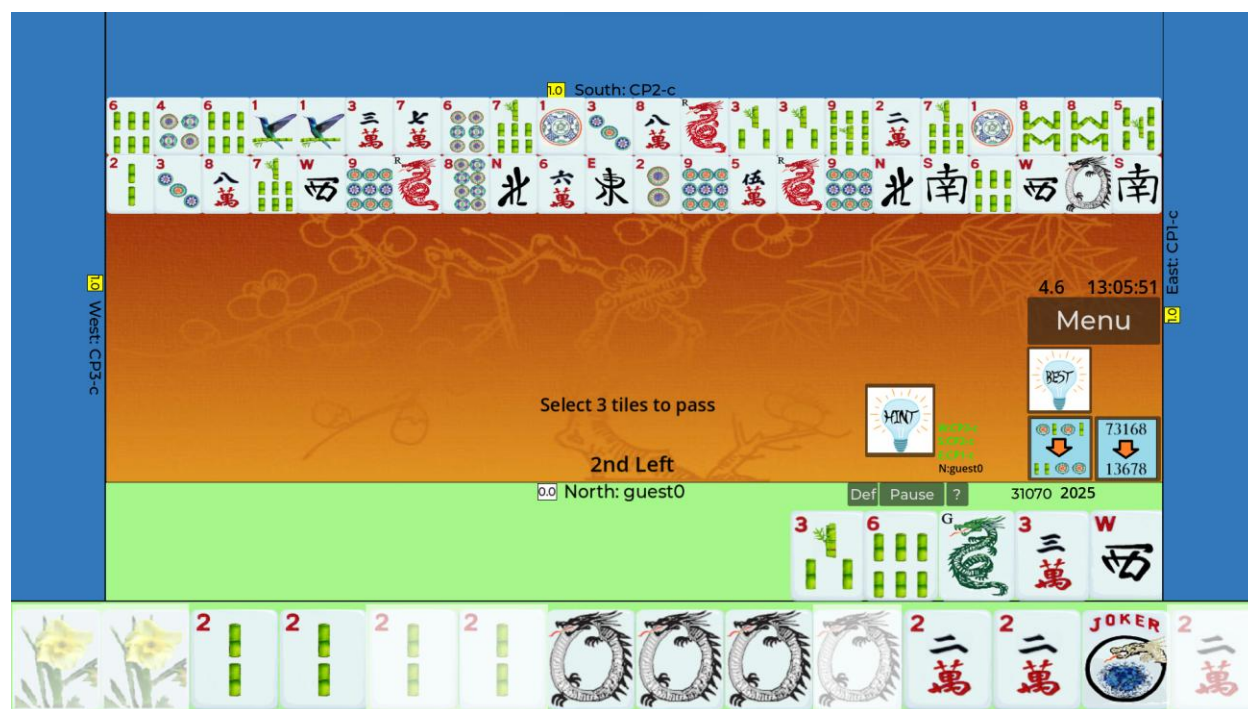


Figure B2. *Sorting by Recommended Hand – Same hand as Figure B1, Table Type “Table 1”.*

Up to 8 computer-recommended hands (goal hands or “Best Hands”), can be shown in a popup display, Figure B3. These goal hands are shown below the top row of the player’s current tiles. Text below each hand shows the category name, card line number, open(X) or closed(C), hand value, number of matching tiles you have, and current hand completion odds. Hands are ordered from highest to lowest winning odds from top to bottom. The option with the highest odds is shown on the rack bottom row when the “Hint” button is pressed. There may be additional hands that have the same odds, but only one is shown as the hint. The “Best Hands” popup display is selected by pressing the “B” key, pressing the “B” display button, or by selecting the “Best Hands” option from the Menu. The popup is closed by pressing outside the popup, pressing “B” again, or selecting “Clear.” Only hands with odds greater than zero are shown. Beginner

players are shown up to 3 possible hands. Intermediate, up to 5 hands, and Pro players are shown up to 8 possible hands.

Any hands shown can be chosen as the sorting hand by clicking on the first tile on the left in the desired row. A small F will be shown at the lower right. This means the sorting/recommended hand is **Fixed** until you clear or select hint again. You don't need to select any of the computer-recommended hands and can choose your own hand to make at any time.

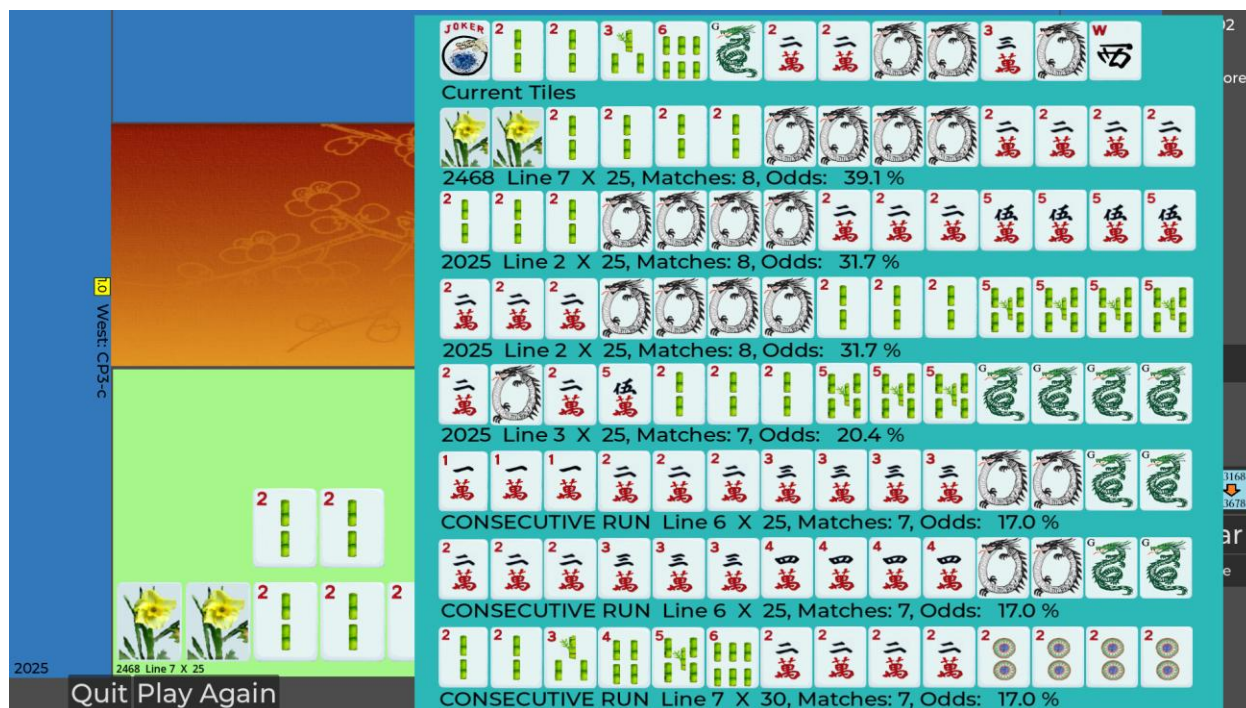


Figure B3. “Best Hands” Popup Display.

Figure B4 shows another popup display like “Best Hands” called “Best Groups.” This display shows the current “best” hand of up to nine categories. The categories are ordered by winning odds with highest odds at the top. As in the “Best Hands” display, best is determined by the calculated odds of getting Mah Jongg before the tiles run out. The odds usually start out low and increase (hopefully for you) as the game continues. Odds are shown in percent (%) chance from zero to 100. “Best Groups” is accessed by the “G” key or by selecting it from the Menu. It is closed by pressing outside the popup, pressing “C” again, or selecting “Clear.” If a category has no hands with greater than 0 odds, the category is not shown.



Figure B4. “Best Groups” Popup Display Example.

The Tile Status display is shown in Figure B5.

Tile	Hand	Shown	Discard	Left	P1	P2	P3	P3C	P4	P4C	P7	P8
1B	0	0	0	4	0.519	0.199	0.043	0.043	0.000	0.000		
2B	0	0	0	4	0.519	0.199	0.043	0.043	0.000	0.000		
3B	0	0	0	4	0.519	0.199	0.043	0.043	0.000	0.000		
4B	1	0	0	3	1.000	0.519	0.199	0.199	0.043	0.043		
5B	0	0	0	4	0.519	0.199	0.043	0.043	0.000	0.000		
6B	0	0	0	4	0.519	0.199	0.043	0.043	0.000	0.000		
7B	0	0	0	4	0.519	0.199	0.043	0.043	0.000	0.000		
8B	1	0	0	3	1.000	0.519	0.199	0.199	0.043	0.043		
9B	0	0	0	4	0.519	0.199	0.043	0.043	0.000	0.000		
DG	0	0	0	4	0.519	0.199	0.043	0.043	0.000	0.000		
1C	0	0	0	4	0.519	0.199	0.043	0.043	0.000	0.000		
2C	1	0	0	3	1.000	0.519	0.199	0.199	0.043	0.043		
3C	0	0	0	4	0.519	0.199	0.043	0.043	0.000	0.000		
4C	0	0	0	4	0.519	0.199	0.043	0.043	0.000	0.000		
5C	1	0	0	3	1.000	0.519	0.199	0.199	0.043	0.043		
6C	0	0	0	4	0.519	0.199	0.043	0.043	0.000	0.000		
7C	1	0	0	3	1.000	0.519	0.199	0.199	0.043	0.043		
8C	0	0	0	4	0.519	0.199	0.043	0.043	0.000	0.000		
9C	1	0	0	3	1.000	0.519	0.199	0.199	0.043	0.043		
DR	1	0	0	3	1.000	0.519	0.199	0.199	0.043	0.043		
1D	0	0	0	4	0.519	0.199	0.043	0.043	0.000	0.000		
2D	2	0	0	2	1.000	1.000	0.856	0.384	0.178	0.080		
3D	0	0	0	4	0.519	0.199	0.043	0.043	0.000	0.000		
4D	1	0	0	3	1.000	0.519	0.199	0.199	0.043	0.043		
5D	0	0	0	4	0.519	0.199	0.043	0.043	0.000	0.000		
6D	0	0	0	4	0.519	0.199	0.043	0.043	0.000	0.000		
7D	0	0	0	4	0.519	0.199	0.043	0.043	0.000	0.000		
8D	0	0	0	4	0.519	0.199	0.043	0.043	0.000	0.000		
9D	2	0	0	2	1.000	1.000	0.856	0.384	0.178	0.080		
DW	1	0	0	3	1.000	0.519	0.199	0.199	0.043	0.043		
WN	0	0	0	4	0.519	0.199	0.043	0.043	0.000	0.000		
WE	0	0	0	4	0.519	0.199	0.043	0.043	0.000	0.000		
WW	0	0	0	4	0.519	0.199	0.043	0.043	0.000	0.000		
WS	1	0	0	3	1.000	0.519	0.199	0.199	0.043	0.043		
JO	0	0	0	8	0.825	0.638	0.451	0.281	0.145	0.056	0.012	0.000
FL	0	0	0	8	0.825	0.638	0.451	0.281	0.145	0.056	0.012	0.000

Figure B5. *Tile Status Display.*

Tile Status Display: The tile status display shows statistics in columns for each tile type. A code for each tile type is listed in the far-left column. The columns from left to right indicate, for each tile type, how many are:

Hand: in your hand not shown/exposed
Shown: shown by anyone
Discard: discarded by anyone
Left: left in the wall or in someone else's hand

The columns labeled P# or P#C are the probability that you will have at least that number (#) of the tile before the tiles run out. The probability shown is 1.0 if you have at least that number in your hand now. The columns with "C" in them are closed-hand probabilities.

If you only need one tile, an asterisk will be shown next to any tiles you can call for Mah Jongg.

B.2 Defensive Help

An example Defense Data display is shown in Figure B6 below.

LR:JO,LRun:4C		South(932,G=0,L=0)		West(932,G=0,L=0)		North(932,G=0,L=0)	
Tile	Left	UseOdds(%)	#Discard	UseOdds(%)	#Discard	UseOdds(%)	#Discard
1B	4	6.9,	0	6.9,	0	6.9,	0
2B	4	10.5,	0	10.5,	0	10.5,	0
3B	3	13.6,	0	13.6,	0	13.6,	0
4B	4	11.8,	0	11.8,	0	11.8,	0
5B	4	12.4,	0	12.4,	0	12.4,	0
6B	4	14.1,	0	14.1,	0	14.1,	0
7B	3	11.4,	0	11.4,	0	11.4,	0
8B	2	9.9,	0	9.9,	0	9.9,	0
9B	3	8.8,	0	8.8,	0	8.8,	0
DG	4	10.2,	0	10.2,	0	10.2,	0
1C	4	6.4,	0	6.4,	0	6.4,	0
2C	4	10.1,	0	10.1,	0	10.1,	0
3C	4	13.2,	0	13.2,	0	13.2,	0
4C	3	11.4,	0	11.4,	0	11.4,	0
5C	4	12.0,	0	12.0,	0	12.0,	0
6C	4	13.6,	0	13.6,	0	13.6,	0
7C	4	10.9,	0	10.9,	0	10.9,	0
8C	4	9.4,	0	9.4,	0	9.4,	0
9C	4	8.4,	0	8.4,	0	8.4,	0
DR	3	17.9,	0	17.9,	0	17.9,	0
1D	4	6.4,	0	6.4,	0	6.4,	0
2D	4	10.1,	0	10.1,	0	10.1,	0
3D	4	13.2,	0	13.2,	0	13.2,	0
4D	4	11.4,	0	11.4,	0	11.4,	0
5D	4	12.0,	0	12.0,	0	12.0,	0
6D	3	13.6,	0	13.6,	0	13.6,	0
7D	4	10.9,	0	10.9,	0	10.9,	0
8D	4	9.4,	0	9.4,	0	9.4,	0
9D	4	8.4,	0	8.4,	0	8.4,	0
DW	3	18.9,	0	18.9,	0	18.9,	0
WN	3	13.1,	0	13.1,	0	13.1,	0
WE	4	13.1,	0	13.1,	0	13.1,	0
WW	3	13.1,	0	13.1,	0	13.1,	0
WS	3	13.1,	0	13.1,	0	13.1,	0
JO	7	0.0,	0	0.0,	0	0.0,	0
FL	7	32.3,	0	32.3,	0	32.3,	0

Figure B6. *Defense Data Display.*

Defense is about knowing what tiles you should not discard (are most risky) and when you should not (and should) discard them. Figure B6 above shows the raw defense data for each tile and player opponent. This example is for East's opponents and for the 2022 card at the beginning of a game. The top left corner lists two tile types that are tagged with "LR:," Least Risk, and "LRun:," Least Risk Unused. The tiles in this example are "JO" or joker and "4C" or 4 crak. The LR (Least Risk) is the overall (all your tiles) least risk tile to discard. A joker is always low risk to discard because it cannot be called. Jokers are often discarded near the end of a game after you decide

there is more chance of losing than winning. LRU_n (Least Risk Unused) is the least risk tile that is currently unused in the hand you are making.

There are 3 pairs of columns labeled at the top with player position, “South”, “West”, and “North” in this example. Each column shows the odds of a particular opponent needing the tile listed in the furthest left column. Since this example is for the beginning of the game when no tiles have been called and exposed, the odds are the same for each player.

The numbers in parentheses after the opponent’s position name are the number of possible hands, card category(C=#), and card line number (L=#), if known based on tiles showing and discarded. Because at the beginning of the game all hands are possible, the 932 number is the number of unique hands defined by the 2022 card. The card category number will be zero unless there is only one category possible. The card line number will be zero unless there is only one hand possible. The categories for the 2022 card are:

1. 2022
2. 2468
3. Any Like Numbers
4. Quints
5. Consecutive Run
6. 13579
7. Winds-Dragons
8. 369
9. Singles and Pairs

There are two columns shown for each opponent. The first is the odds that the opponent has a particular tile in a hand they can make (not already exposed). Odds of 100% means that they will use that tile type in a hand they can make and they **might** be able to call the tile. Jokers always have zero call odds because they can never be called. The other tile’s odds depend on tiles discarded so far and tiles exposed by each opponent. Beginning odds when no tiles are yet called give the approximate odds of each tile type being used. For the 2022 card, this is the percentage of the 932 unique hands that use each type tile in at least one set. In the 2022 card, the flower tile has the highest starting use percentage of 32.3%.

The second column is how many of each tile has been discarded so far by the listed opponent.

This raw data display is not the only form of defensive help available. There are two other types of defense help:

1. Defensive Status Display – shows current level of defensive risk, both overall and, optionally, in 5 different areas
2. Discard Selection Warning – indicates when a selected discard tile has significant known risk of being used by an opponent

An example of the Defensive Status Display is shown at the bottom of Figure B7 (above the “Done” button).

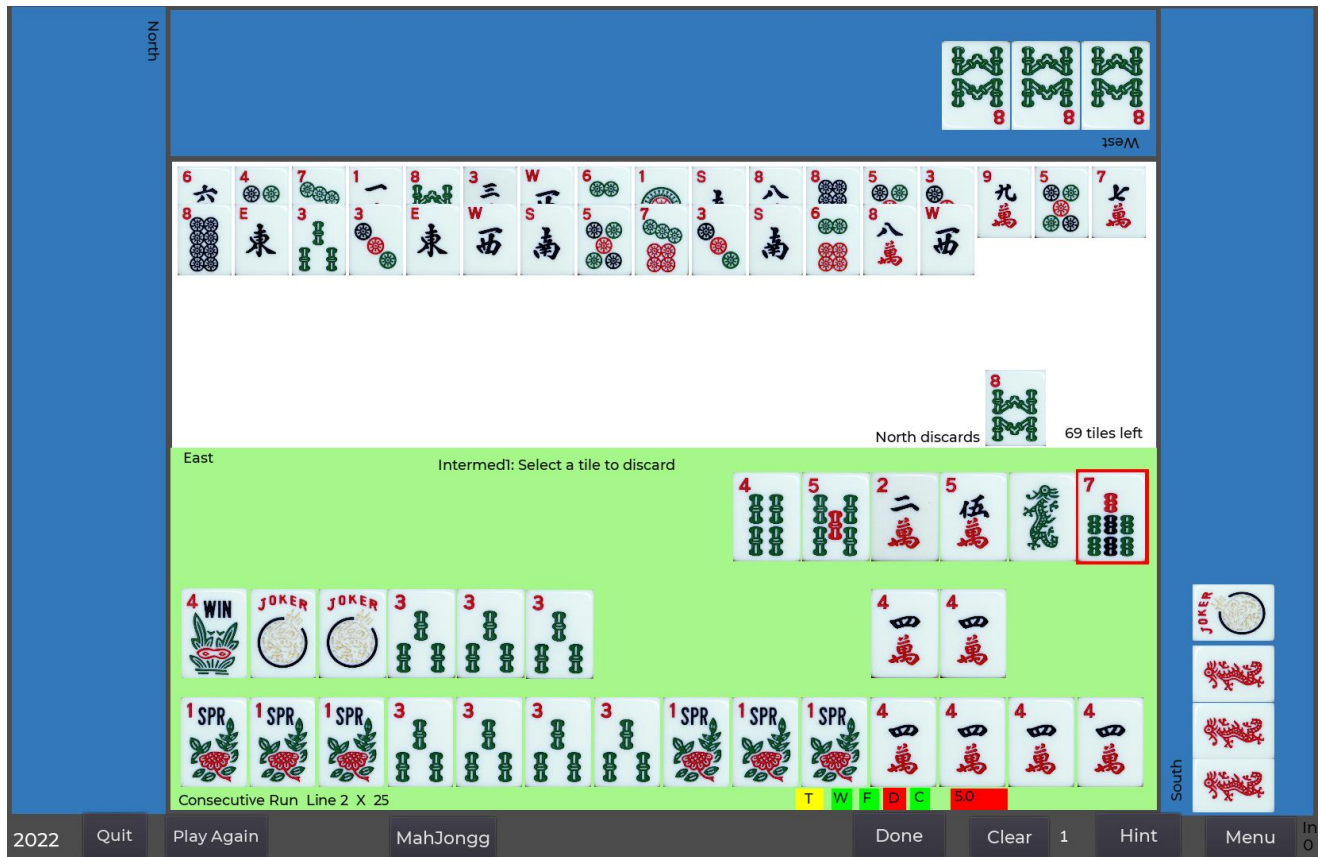


Figure B7. Example Display showing Defense Status (Table Type “Table 2”).



Figure B8. *Zoomed in on the Defensive Status Display Section.*

The status is shown based on the following 5 risk areas, each with three risk levels calculated (Green = Low, Yellow = Medium, Red = High):

1. **T** = **T**ime to get tiles needed for Mah Jongg is limited
2. **W** = **P**robability of **W**inning is relatively low
3. **F** = **F**ew possible hands are left for opponent(s) (you may know what not to discard)
4. **D** = **D**angerous **D**iscard tiles are in your hand (likely tiles to be used by an opponent)
5. **C** = **C**lose to Mah Jongg – opponent(s) showing many tiles are likely close to Mah Jongg.

The last numeric indicator (5.0 in this example) is an overall risk level quantified between 0 and 5 with 0 as lowest risk and 5 as highest risk. In this example, **T**=Time needed is medium risk (yellow) because the number of tiles needed for Mah Jongg is getting too close to the expected number of turns left. The Dangerous Discard area is high risk (red) because one of the tiles is likely to be needed by an opponent (West). The overall risk is the scaled average of the individual risks with the scale factor depending on the defense help level setting. The Defense help level also sets what defense status data is displayed. A Defense help level of “Min” only shows a warning if a tile selected

for discard is risky (described in the next paragraph). This data is also only shown when the overall risk level is medium or high (yellow or red). You should be more willing to break up your hand and try to force a wall game if the risk level is high (red). Before you reach the medium risk level, a tile may still be risky to discard, and it is up to you to decide. The Defense Data display will show the odds that the tile can be used by your opponents.

Figures B7 and B8 above show an example with a tile selected for discard (7 bam) indicating a high risk of being used by an opponent (West in this case). The high risk is indicated by a selection highlighted in red, rather than the normal blue. If the risk level was medium, the selection highlight color would be yellow. The 7 bam tile has a 60% chance of being needed by West. This can be seen by the corresponding Defense Data display, Figure B9. This display also shows that West has 10 possible unique hands left that can be made. Note that in this case, the odds of calling the 8 bam tile by West are shown and are zero because West has already exposed a set of three 8 bams and you can't add to an exposed hand. If the Flower tile were not being used and selected, it would also show a high risk due to a 61.9% chance of being needed by South. When a goal hand is shown and used to sort your tiles, the discard warning is based only on the "Extra" tiles that are not being used (upper right of green rack). In this case, it would let you select and discard the Flower without warning you, even though South probably needs it. To get warnings for all the tiles, you need to stop showing the hint.

If the Dangerous Discard (D) status indicator/button is shown, the tiles that are least and most risky can be shown by pressing the "D" button/indicator. Any medium or high-risk tiles will be highlighted in yellow or red. The lowest risk tiles will be highlighted in green. There are 2 shades of green, one is for the overall lowest-risk tile, and the other is for the lowest-risk tile you are not using in the current goal hand. Note that the lowest-risk tiles can also be high risk but will still be shown as green unless you select them. If risky and selected, the green color will change to yellow or red. If Auto Done is set and a risky tile is selected, the tile is not automatically discarded and Auto Done will be suspended until the Done button is selected. Flowers are almost always risky for the 2022 and 2023 cards.

Notes on Defense Discard warnings: Please note that even if there is a 100% chance that the discarded tile type is used by an opponent, this does not mean that they are able to call the tile or don't already have all of that type tile they need. The logic only uses information that the real player has available: what tiles have been discarded, exposed, and are in the primary player's hand, along with knowledge of all the possible hands. The actual tiles in the opponent's hand are not used by the logic. In many cases, the tile will be needed for a single or pair but will only be able to be called if it is the last tile needed. The defense logic does not know if it is the last tile needed (unless the player

has 13 tiles exposed, which is highly unlikely and not possible on the 2022 card). It is up to you to decide how much risk to take and which tiles to discard.

It is difficult to decide to break up your hand and give up on winning. If possible, switch to a different hand that uses the tiles that are too risky to discard. However, if the odds are high enough that you are going to lose, it is better to play defense and force a wall game to maximize your long-term score. Beginning players need to learn offense first and focus on learning the rules and how to win. Practicing defense comes later. That is why the default Defense Help is “None” for skill type Beginner. The default setting for Intermediate and Pro is “Avg.” The default Defense Help level can be changed at the beginning of the game and stored, if desired.

Playing defense is particularly important if playing for money or playing in a tournament. Tournaments may decrease your score if you give Mah Jongg to a player by discarding a tile you could have known they needed. Others playing along with you will not be happy if you unnecessarily give Mah Jongg to a common opponent, causing them to also lose.

LR: JO, LRUn: 2C		South(21,G=0,L=0)		West(10,G=0,L=0)		North(544,G=0,L=0)	
Tile	Left	UseOdds(%)	#Discard	UseOdds(%)	#Discard	UseOdds(%)	#Discard
1B	4	9.5,	0	0.0,	0	6.8,	0
2B	4	23.8,	0	10.0,	0	12.1,	0
3B	0	4.8,	0	0.0,	1	9.2,	0
4B	3	14.3,	0	10.0,	0	12.7,	0
5B	3	9.5,	0	10.0,	0	13.4,	0
6B	4	14.3,	0	70.0,	0	17.3,	0
7B	3	14.3,	0	60.0,	0	12.1,	0
8B	1	14.3,	0	0.0,	0	8.1,	1
9B	4	4.8,	0	10.0,	0	9.2,	0
DG	3	23.8,	0	30.0,	0	9.6,	0
1C	3	0.0,	1	0.0,	0	7.4,	0
2C	3	9.5,	0	10.0,	0	12.9,	0
3C	3	0.0,	0	0.0,	1	15.4,	0
4C	2	4.8,	0	10.0,	0	13.4,	0
5C	3	0.0,	0	0.0,	0	15.1,	0
6C	3	4.8,	0	0.0,	0	17.8,	0
7C	3	0.0,	0	10.0,	0	13.8,	1
8C	2	4.8,	0	20.0,	1	11.8,	1
9C	3	0.0,	0	0.0,	0	9.0,	1
DR	1	0.0,	0	20.0,	0	6.4,	0
1D	3	9.5,	0	0.0,	1	5.9,	0
2D	4	23.8,	0	10.0,	0	12.5,	0
3D	1	4.8,	0	0.0,	0	10.5,	2
4D	3	14.3,	0	10.0,	1	11.0,	0
5D	1	9.5,	0	0.0,	1	7.7,	0
6D	2	14.3,	0	0.0,	1	13.1,	1
7D	2	14.3,	2	10.0,	0	11.0,	0
8D	2	14.3,	1	20.0,	0	10.7,	0
9D	4	4.8,	0	0.0,	0	9.4,	0
DW	4	23.8,	0	30.0,	0	18.8,	0
WN	4	0.0,	0	10.0,	0	10.8,	0
WE	2	0.0,	1	10.0,	1	6.4,	0
WW	1	0.0,	2	10.0,	0	3.5,	1
WS	1	0.0,	1	10.0,	0	4.8,	0
JO	5	0.0,	0	0.0,	0	0.0,	0
FL	7	61.9,	0	10.0,	0	45.8,	0

Figure B9. Defense Data Display Example for Discard Risk Warning.

Appendix C. Game Setup Options

Game options can be set and stored in an “Option Profile.” If the network is enabled when the app starts, Figure C1 will be shown. If the network is disabled, you can select “Options/Lobby” from the game during your turn to get to the Figure C1 display. If the network is disabled, after the first time the game runs, the game will automatically start without showing Options/Lobby. If you are starting the app for the first time, after a setup/lobby page, you will first see the “Select Login Type” page, Figure C1.

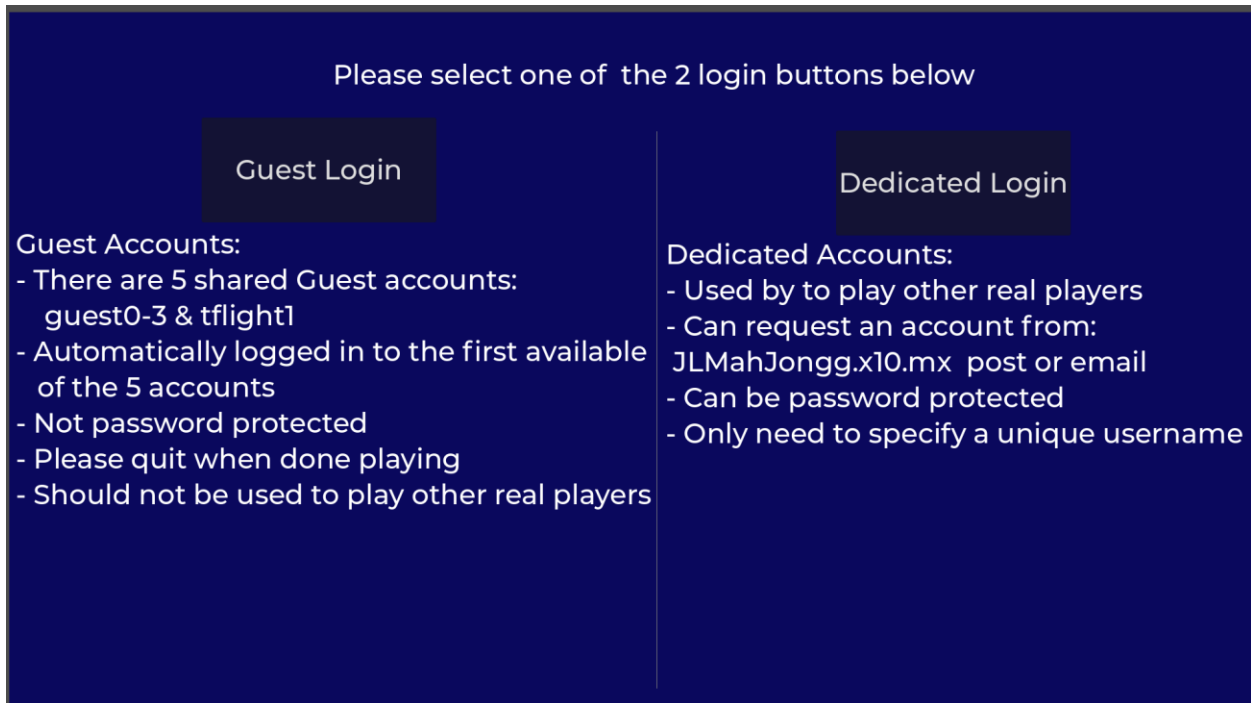


Figure C1. *Options/Lobby Screen Example.*

The difference between Guest and Dedicated accounts are described in the Figure C1 display. If you are a regular user and have a dedicated account with your own username, select the “Dedicated Login” button.

If you select “Guest Login,” the app will log you in to one of the 5 guest accounts. The Setup/Lobby display is shown, Figure C2. Since it is your first time using JLMahJongg, you are given beginner skill and the Basic1 card by default. You can change these using the “Skill Level” and “Card Type” drop down buttons. Otherwise, select the “Start New Game” button to start a game or one of the 3 tutorial buttons to the right.

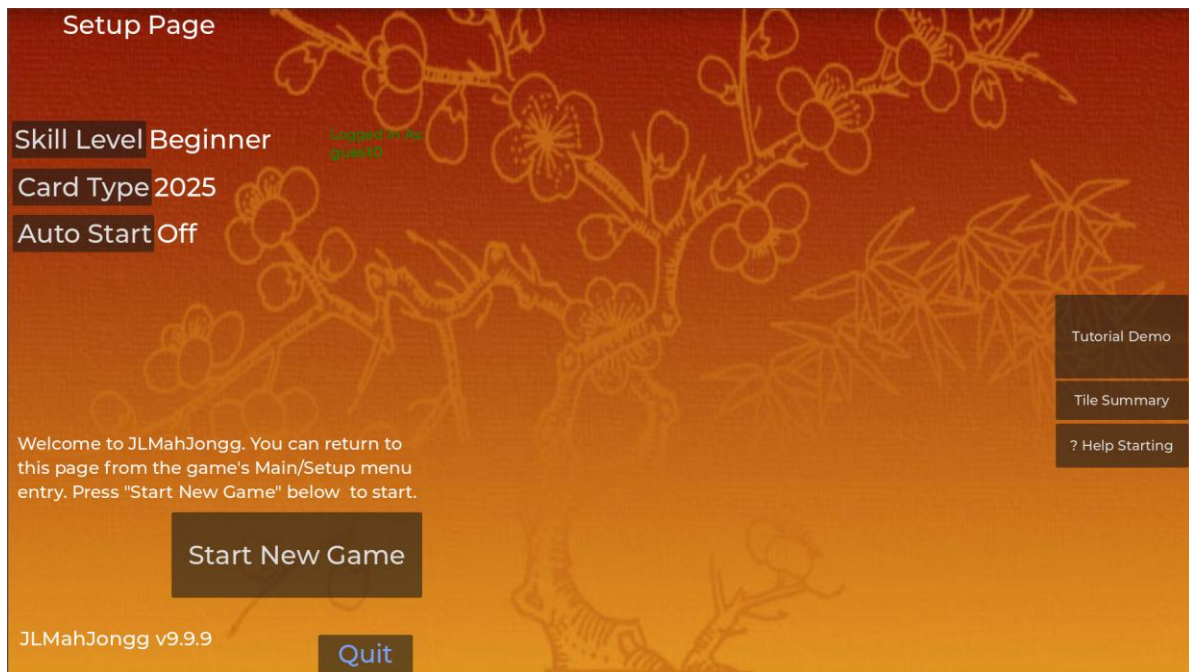


Figure C2. Setup Page with Default Beginner Skill and Card Type.

If you start a game, the initial game display (Table Type 2) will look something like Figure C3.



Figure C3. Example Starting Display.

Options. If you select the “Advanced Setup” button, the current options for the selected skill level, Figure C4, will be displayed. There are 2 option columns, each with an option button and the current value. Any options can be changed before a game is started. Most options can also be changed during a game (except Card Type, Start Position, and Network Settings). To change an option, click the option button/name and select the desired new value.

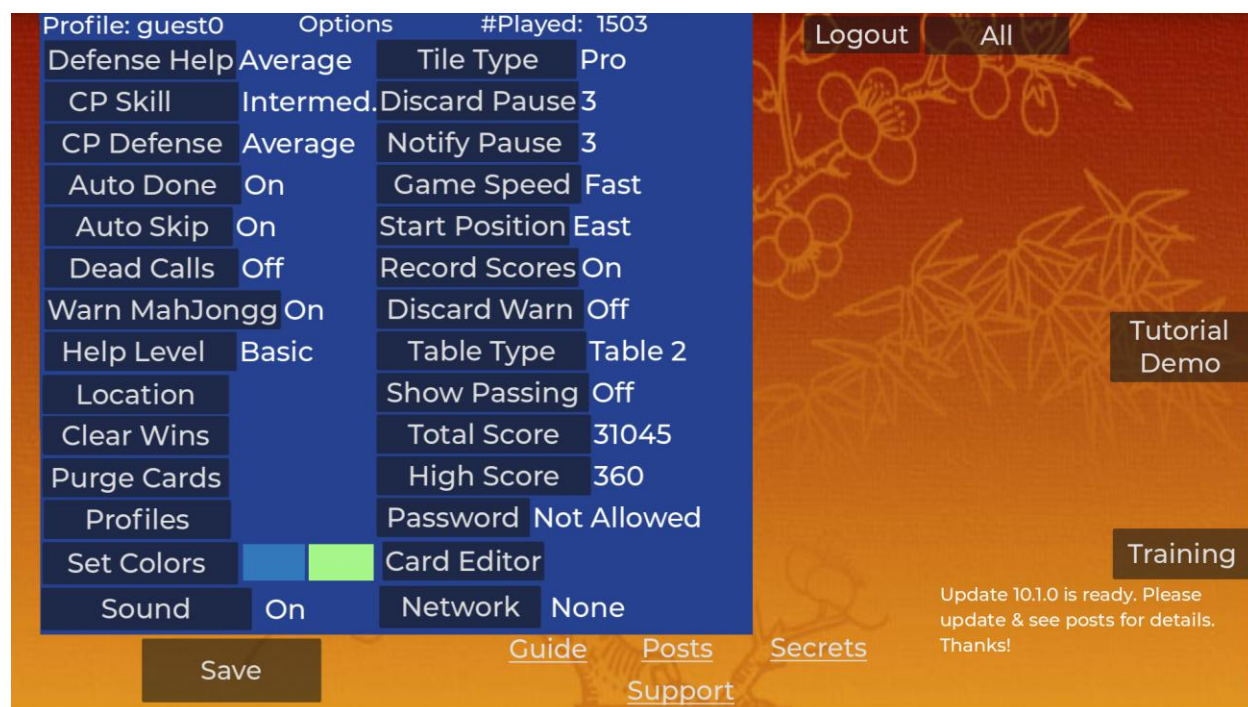


Figure C4. Player Options (default intermediate options in this example).

After modifying any options, press the “Save” button to close the options window and save any changes. These options are a stored profile specific to a device. All stored profiles can be viewed or modified using the “Profiles” button. Additional profiles can be added and saved. The last active profile will be the active profile the next time you start. Profiles are specific to a particular device and browser type. If you run the game on a different device or browser, profile changes will need to be re-entered. These options are for a primary player that will be playing locally on the device. The primary player position is always at the bottom of the display.

Two primary options are directly on the Setup page. These options are:

Skill Level: Changing the skill level resets all parameters to the default for that level. Default settings for higher skill levels are faster and allow fewer mistakes. There are 3 skill levels: Beginner, Intermediate, and Pro. Higher skill levels have fewer help options available by default. To reset to the default skill level values without deleting the profile, change to a different skill level and then back to the desired skill level.

and

Card Type: The available Mah Jongg cards that define winning hands are selected here. There are both standard National Mah Jongg League card(s) (current card name is the current year) and custom JLMahJongg cards available.

The rest of the setup options are considered “Advanced Setup:”

Defense Help: Defense help options give information about which tiles are most likely to be needed by the other players. Defense prevents another player from calling Mah Jongg and prevents them from calling a tile you discard. The defense help options are “None,” “Min,” “Average,” and “Max.” Defense help is described in more detail in Appendix B [Defense](#).

CP (Computer) Skill: This sets computer player’s artificial intelligence level. Higher skill levels are harder to beat.

CP Defense: This sets the defense level played by the computer players. The options are: None, Min, Avg, and Max. Max means the computer players play the most aggressive defense, and None means they don’t play any defense.

Auto Done: Setting “Auto Done” to “On” ends the players turn as soon as the required number of tiles are selected. If set to “Off,” the player can change the selection(s) until the done button is pressed. The game is faster if “Done” does not need to be pressed after each selection. However, if using “Auto Done,” be careful when manually moving a tile. Hold down the mouse button (or touch screen) until after it is moved or it will be selected and automatically discarded. Also, make sure to move the tile far enough horizontally, but keeping it approximately in line with the other tiles vertically. Not moving the tile far enough or moving it too far vertically selects it (and discards with Auto Done set). On touch screens you need to select the tile on the top half of the tile and should move it using the bottom half. You can set auto done to “Discard” or “Discard Drag” if you only want this feature when discarding a single tile and not during the Charleston. “Discard Drag” only performs auto-done if a tile is dragged up to select it for discard.

Auto Skip: The purpose of “Auto Skip” is to speed up the game when you have two or more jokers. Each discarded tile can be called along with 2 jokers to make a set of 3. With two or more jokers, since every discarded tile can be called, the game delays after each discard to allow pressing “Hold,” or “Call.” To avoid this, turn “Auto Skip” on to skip discarded tiles that are not needed in the goal hand. If a goal hand has not been identified, the app tries to guess what hands you might be making. It will automatically skip if you have at least 2 jokers and the tile is not needed for any hand with odds within 25% of the top-odds hand. If you are making a more difficult hand, then you need to

turn “Auto Skip” off using the Menu. If you like keeping “Hint” on, you will probably want “Auto Skip” on.

Dead Calls: If this option is set on, the computer players can call your hand disqualified (dead) if the computer defense level is set above “None.”

Warn MahJongg: If “Warn MahJongg” is “On,” the app warns if you can call a tile for Mah Jongg. A green “MahJongg” button will pop up if you can call a tile for Mah Jongg. If “Warn Mah Jongg” is “Off,” then you will see a Mah Jongg button every time you have 14 tiles or can call a tile, and you will need to manually know you have Mah Jongg and press the button to call it.

Help Level: The help level determines the available data on how to play and the recommended hands. The help levels are shown in Table C-1 along with automated aids that are enabled at each level. The default Help Level for skill level Beginner is “All,” Intermediate is “Basic,” and Pro is “None.” The default help levels can be changed during setup. If defense help is enabled, the defensive help amount is controlled by the Defense Help setting (see Appendix B, [Defense](#)).

Table C-1. *Default Automated Help Features for Each Help Level*

Help Level	Hint	Best Hands	Best Groups	Tile Ranks	Tile Status	Defense
None	No	No	No	No	No	No
Basic	No	Yes	Yes	No	No	Yes
All	Yes	Yes	Yes	Yes	Yes	Yes

Location: Lets you change the location shown for you from the default USA value.

Clear Wins: Deletes all previous wins recorded.

Purge Cards: This button removes all temporary card files that have been saved. Purging saved cards may be necessary if an app upgrade modifies the card format. Any removed temporary cards are automatically regenerated with the latest format. The stored temporary card formats help make the app startup faster.

Profiles: Pops up a window that can be used to modify, add, or delete profiles of game parameters. If more than one person uses the same device to play, each person can save their own profile.

Set Colors: Press this button to select the background rack color and/or the color used to highlight the current players turn during the draw and discard phase. You can also change the rack text between black and white to enable either a dark or light rack background.

Sound: Pressing the “Sound” button pops up a menu that controls the game sound, Figure C5. The tile discarded, game phase, and notifications are played during the game when the Sound setting is on. Voices can be enabled separately from sound effects. Sound can be muted and unmuted during the game. Additional delay is added when the sound is on to give enough time for the discarded tile names to be voiced; so disabling (muting) the sound can speed the game.

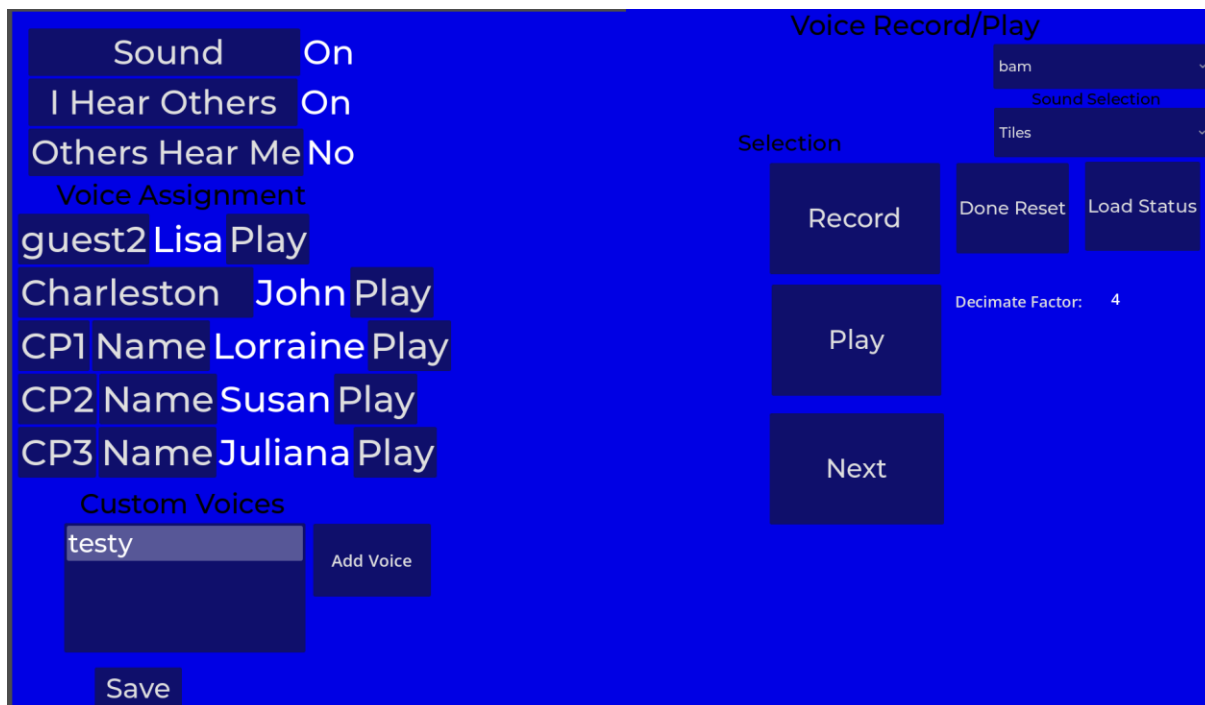


Figure C5. *Sound Options Display.*

The two buttons below the “Sound” button enable/disable the sound when playing a multiplayer game over the internet. If “I Hear Others” is on, you can receive and hear other player’s custom voices. “Voice Permission” enables others to receive and hear a custom voice that you record. Voice permission can be “None,” “Restricted,” or “Public.” Restricted means that other players can only use your voice for you. Public permission means other players can also use your voice for computer players.

Below the top 3 control buttons are five rows that control voice assignments. You can assign different voices to each player and to the Charleston voice. Change CP names by selecting the current CP name. Either a standard or custom voice can be assigned to each player and the Charleston voice.

Up to four custom voices can be added using the bottom left and the right-side display elements. To enter a custom voice: press “Add Voice,” enter a voice name. The voice name needs to be your username if you want to share it for others to use. Then select “Record” on the right side and say the word(s) it shows to record. You have about 1.5 to 3 seconds to record the proper word(s). Start saying the words as soon as you see the red record dot go on. You can play back the recording by pressing “Play.” When done recording a word, press “Next” to go to the next word to record. There are two sets of words: 1) Tiles, and 2) Charleston passes. Only custom voices (Tiles only) can be passed over the internet. The Charleston voice needs to be one of the standard voices. You are not allowed to use someone else’s custom voice as your voice (top assignment).

If you record a custom voice, you may want to edit the sound files to make them as short as possible (no extra time with no sound) and adjust the volume. A good free app to do this is Audacity. To edit a sound file in Audacity: open the file, select a segment you want to edit out and select “Edit>Delete.” Next press “Control A” to select the entire clip. Select Effect>Volume and Compression>Amplify and then apply the default amplification that makes the largest sample 0 dB (1). Use File>Export to save the modified clip. Make sure the output format is .wav, mono, signed 16-bit PCM. If you use the default 4x decimation, the sample rate should be about 11kHz.

Voice File Transfers: After a custom voice file has been created, it can be used on your device and/or transferred to other players’ devices so they can hear your voice. Voice files for a particular player only need to be transferred once and are stored for future games unless they are overwritten by an alternate player’s voice in a future game.

Voice files are transferred as needed for a particular game and all files transfer via the host device (acts as a voice server). Voice file transfers happened automatically when players connect to a host and are shown on the lower left of the lobby display. The game can’t start until all the voice files are transferred. Voice file transfer can take a while to transfer the relatively-large voice files. The voice file size can be adjusted by setting the decimation factor when recording. A decimation factor of 4 means that only every 4th voice sample is used, decreasing the file size by a factor of 4 compared with using all samples. There is a tradeoff between file size and voice quality. The default decimation factor of 4 gives a good tradeoff between size and quality. A decimation factor of 4 results in each voice file being about 25 Kbytes. There are 25 files per custom voice set, one file for each word used. The voice data is compressed before transferring.

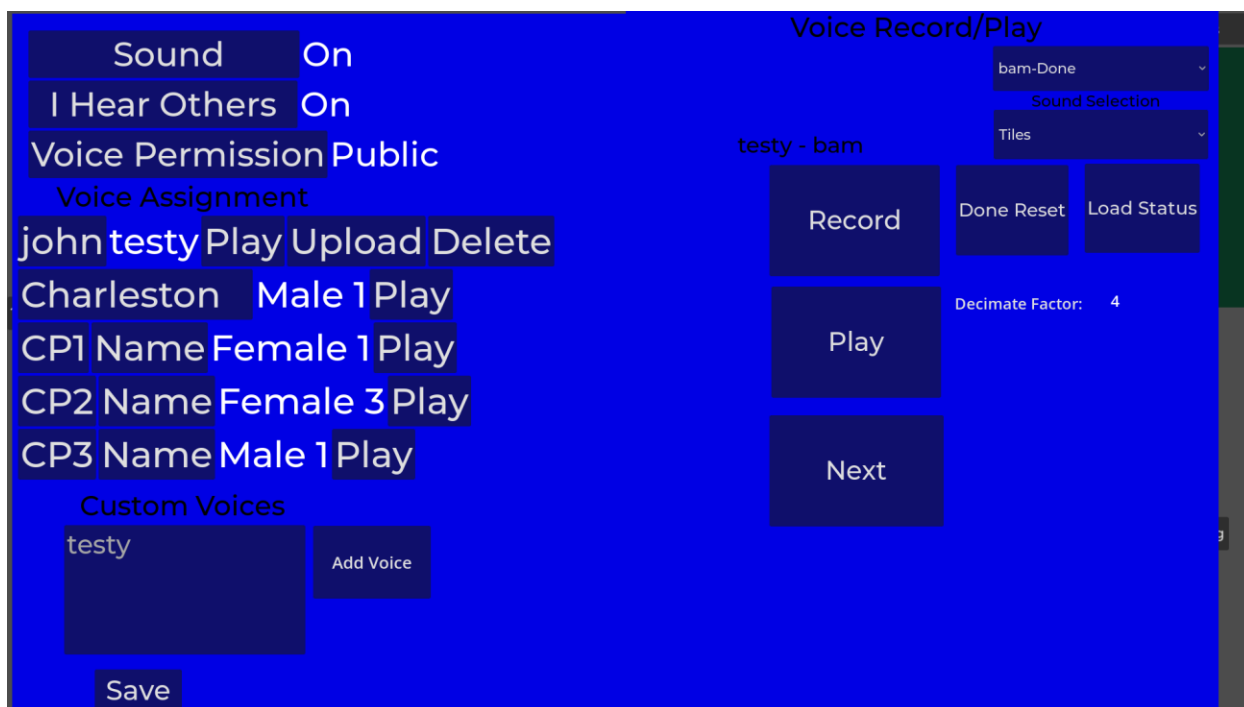


Figure C6. Custom Voice “testy” created and set as john’s voice.

Tile Type: Multiple tile designs can be available. The app is distributed with two tile designs, standard and Pro. Pro is our custom tile set. Additional tile designs can be added.

Discard Pause: The “Discard Pause” is the number of seconds delayed after each player discards before the next player draws a tile. This determines the time available for a player to press the “Hold” or “Call” buttons (if not automatically held). Note: if “Discard Pause” is set too small, you can easily miss calling a tile you need.

Notify Pause: “Notify Pause” is the delay in seconds after displaying messages about players exchanging for jokers, calling tiles, and winning tiles. If this time is short, it will be difficult to see these messages, but the game will be faster.

Game Speed: The “Game Speed” setting controls the overall delay between player turns. You can also speed the game by muting the voice.

Start Position: This setting is the initial start position (East, South, West, or North) of the primary player. This is the table “wind” position of the primary player who is always at display bottom. For multiplayer games, the host can select his position and the other players’ positions are assigned based on when they join. East starts the draw and discard phase and play proceeds counter-clockwise around the table. By default, the primary player is East. Do not confuse the position wind names with wind tiles. Player positions and wind tiles are separate and have no relationship, even though they are both winds.

Record Scores: This is either: “On” or “Off.” If “Off,” your score is not accumulated or considered for the game “Records” scoreboard. When “On,” you lose 50 points every time you quit or restart in the middle of a game. This is to prevent restarting over and over again until you have a good starting hand, artificially building up your score and skill level.

Discard Warn: This option configures warnings about tiles selected for discard. Options are: Off, Defense, Offense, and All. The **Defense** discard warnings highlight the tile selected for discard in yellow or red if the tile is considered likely to be used by an opponent based on what tiles they are showing and what has been discarded. The **Offense** warnings highlight in dark green a tile selected for discard that is currently used in the “Best” hand. When the warning is enabled, the tiles are not automatically discarded but can be discarded by pressing the “Done” button. The “All” option enables both offensive and defensive discard warnings. Offensive warnings can help prevent accidentally discarding tiles you need when “Auto Done” is enabled.

Table Type: Mah Jongg is played on a table. There are 3 display table types in JLMahJongg: Table Type “Table 1”, Table Type “Table 2”, and Table Type “Demo.” The default table type depends on the chosen skill and device type. Table Type “Demo” is primarily used for demonstration, tutorials, debugging, guests, or predicting a winner. Table Type “Table 2” is the beginner default unless on an iPad or iPhone, then Table Type “Table 1” is the default. Table Type “Table 1” has less support for game help and has larger tiles. Table Type “Table 1” is optimized for an iPad display. Other than tile size, the main difference between tables is that Table Type “Table 1” has control buttons in the middle and Table Type “Table 2” has control buttons at the bottom and side. You can choose any of the 3 tables to play.

Show Passing: If using Table Type “Table 1”, setting “Show Passing” to “On” lets you see the Charleston passing details. When set to “Off,” the same tiles are passed, but you only see the result.

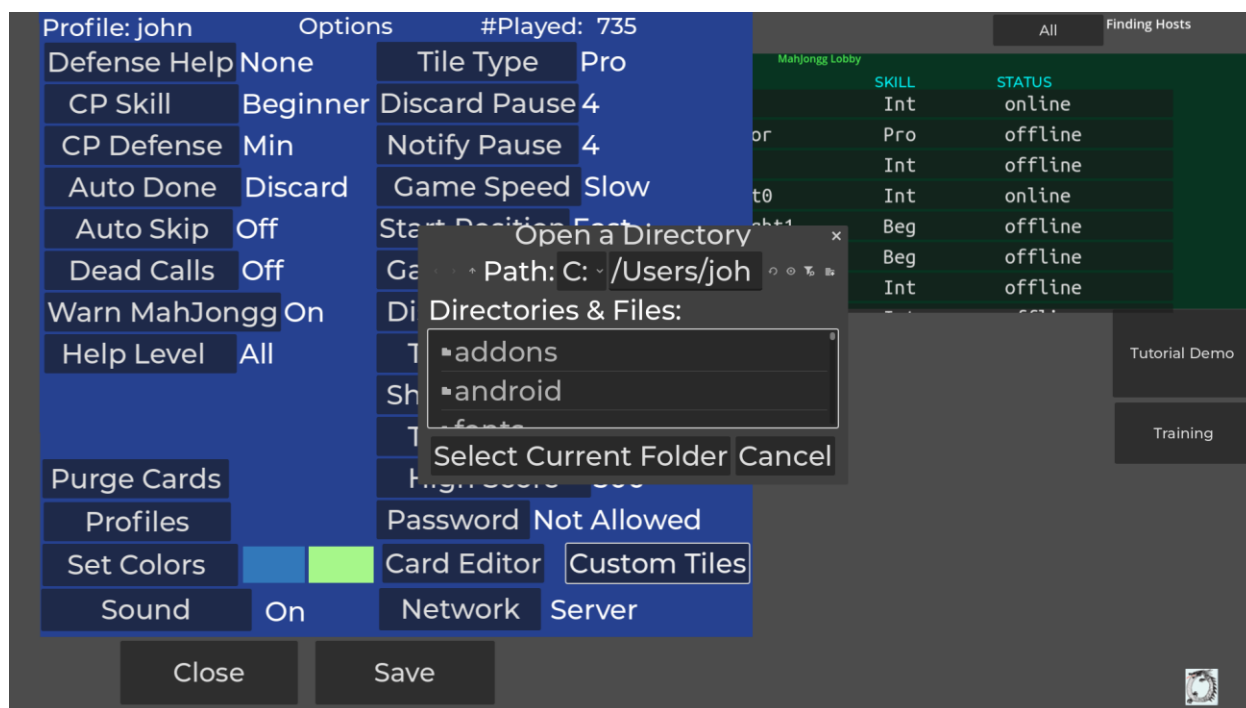
Total Score: The game keeps track of the accumulated total score of any primary player across all past games since being reset. This option enables resetting the total score to zero and shows the current total score. Note that total score will not be accumulated when in Demo mode, if the network is disabled, or if you use automated help above the default for your skill level setting. If you use extra help above your level, your total score won’t increase but will decrease if you lose. This prevents you from getting addicted to help.

High Score: This shows the highest score of any single game since the last time high score was reset. The score in a game depends on which hand is made, if the player draws the last tile for Mah Jongg themselves, and if the final hand is jokerless. The High Score can be zeroed with this button.

Password: Users can set a password to prevent someone else from logging in to the game and playing as you. The game administrator controls the password options available. Passwords are not allowed on the shared guest accounts.

Card Editor: This button opens the popup card editor. The card editor lets you enter or modify a custom card to use. Custom and non-NMJL card can be viewed from the “Menu/View Card” selection during a game.

Custom Tiles: If enabled, this button pops up a directory/folder selection window (see example below) that can add custom tiles that you design yourself to the “Tile Type” selection options. If you select a folder that has the 44 different required tile image files, these files are uploaded to the app and made available to (only) you as a “Custom” option under “Tile Type.” The format for the tile image file is: .png. The file names need to be: 1bam.png to 9bam.png, 1crak.png to 9crak.png, 1dot.png to 9dot.png, green.png, red.png, white.png, north.png, east.png, west.png, south.png, flower1.png to flower8.png, joker.png, and blank.png (tile back). The image resolution needs to be 101 H x 135 V. See [Appendix F](#) for suggestions on how to generate custom tiles.



Network: Pops up a display to configure setup details about how multiple real players can play over the internet. The top-level network setting is on the main setup page. Only detailed settings are in the Network menu. When the network is disabled(Off), a single real player plays against three computer players. There are 2 primary network options: Direct (also called Player-to-player or P2P), Relay. There is an “Auto” network mode

that tries Direct first and falls back to Relay if Direct is not available. See [Appendix D](#) for network setup details.

After all the desired options are selected, you must press “Save” to save them (if any were changed). Otherwise, press the “Close” button.

Multiplayer Setup: Multiplayer means more than one real primary player can play against each other over the internet. Up to 4 real players can play together. If less than 4 real players are available, computer players play the other positions.

The multiplayer game version cannot run in a browser. To play with multiple real players, each player must download and run the app version that is native to their type of device or operating system (OS) being used. The OS types supported are: Windows, OSX (macos), iOS (iPad and iPhone), Linux, and Android. The JLMahJongg app can be downloaded from the JLMahJongg web site for Windows or Linux or also from the appropriate App Store for Windows (MS Store), Google, and Apple (App is free). The multiplayer app can also play with one real player and 3 computer players. The multiplayer version requires access to a configured JLMahJongg server and internet access unless you are playing a single-player game. Our default public JLMahJongg server is JLMahJongg.com.

Note that all players in a game need to use the same release version of the app and use the same server. The app does not currently test for this, but may in the future. Use of different versions has been known to cause errors.

App Download: You can download the Windows and Linux multiplayer apps from the JLMahJongg website. For Windows you can also download from the Microsoft store. For Apple devices, you can install from the Apple App Store for iPads and iPhones. Google/Android devices can download from the Google Play Store. Search for JLMahJongg to find the free JLMahJongg App on these stores. The support web page is: <https://JLMahJongg.com/>

An example JLMahJonggApp download web page is shown in Figure C10. How to get the app depends on your device type. Follow the instructions on the web page to get and run the app. You will not see the game Setup/Lobby until after you download and run the app.

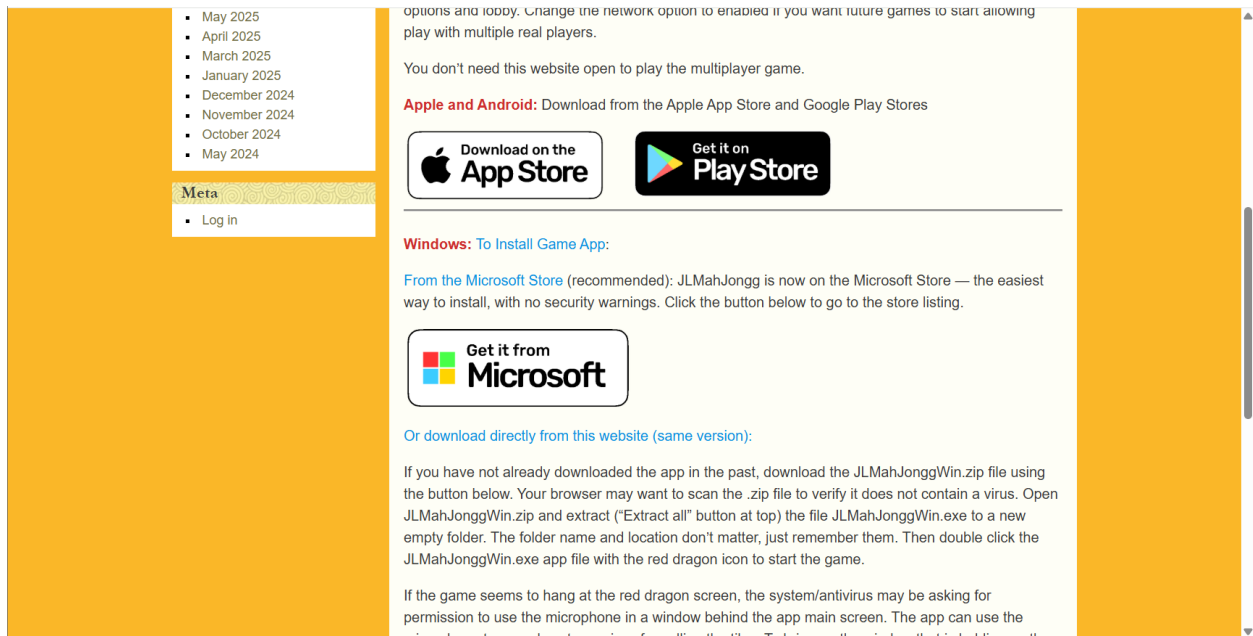


Figure C10. *JLMahJongg App Download Page.*

Multiplayer Startup:

The user data columns are described in [JLMahJongg Multiplayer Game Administration](#).

Each real player in a multiplayer game must enable a “Network” option. If a network option is not enabled, only a single real player can play at that device.

The Account name, the user’s profile name, and skill level are shown in the lobby for each user account. When playing the game, the “Account Name” and “Profile” are used to identify players. The guest accounts show the profile name of any online “guest” or the last guest that was online. The lobby’s right column is each user’s status. The status is one of the following:

- 1) Inactive – Has not played recently (within last month)
- 2) Offline – User is offline
- 3) Online – User is online
- 4) Hosting – User is hosting a game
- 5) Connected – User has connected with a host, but has not joined a game
- 6) Joined – User has joined a game
- 7) Busy – Host that is busy
- 8) Playing – User is playing a game
- 9) Observer – User just observing and possibly betting

Each multiplayer game needs a single host. The app automatically searches for available hosts. It displays “Finding Hosts” at the upper right. This can take up to several minutes, depending on web server availability.

Important notes for multiple real players:

1. All players must use the same server
2. All players must use different account names (profile name can be the same)
3. All players must use the same network type (direct or relay)
4. Host should wait until all other players are listed as “On Line” before pressing the Host button
5. If any players are in a different time zone, the players need to set the network option to allow multiple times zones

The app needs to search for hosts before letting you host. You can limit how long this takes by limiting the users searched. Press the “All” button near the top right in Figure C11 to limit the users searched. Your skill level needs to be above “Beginner” to see this button at the top right of the Setup/Lobby display. To enter a subset (Set) of users to search: **first** select the users, press “Save Set,” and enter a set name. In the Figure C11 example, John and Lisa were selected and saved as the set named “Smigels.” The lobby will then reflect this change, as shown in Figure C12. If you are the host, make sure you

include all players you may want to play with in the selected set. Only players in the selected set will be able to connect with you. If you are a player finding a host, the host is only found if they are in your selected set.

Player Sets

Logout Smigels

Smigels

Save Set

Cancel

john, lisa

Delete Set

Select All	Number	Account	Profile	Last Login	Skill Rating	Location	Card	Online	Network Type
	1	john	john	01/31/2026	Int 0.3	USA	2025	n	S/HTTP
Unselect All	2	biolor	Khiser	01/20/2026	Beg 1.8	USA	2025	n	N/None
	4	lisa	lisa	01/16/2026	Int 3.1	USA	2025	n	D/TCP
Close	6	guest0	guest0	01/31/2026	Int 0.0	USA	2025	y	N/None
	7	tflight1	tflight1	01/31/2026	Beg 0.0	USA	2025	n	N/None
	8	guest1	guest1	01/28/2026	Beg 2.4	USA	2025	n	N/None
Logout	9	guest2	Susan	01/31/2026	Int 0.8	USA	2025	n	S/HTTP
	10	guest3	guest0	01/27/2026	Beg 2.5	USA	2025	n	N/None
	11	laurianne	laurianne	01/20/2026	Beg 0.0	USA	2025	n	N/None
Quit	14	enjoyingBeing	enjoyingBeing	01/27/2026	Beg 0.0	USA	2025	n	N/None
	15	sally	sally	01/26/2026	Beg 0.0	USA	2025	n	N/None

guest0

Figure C11. *Player Sets Page.*

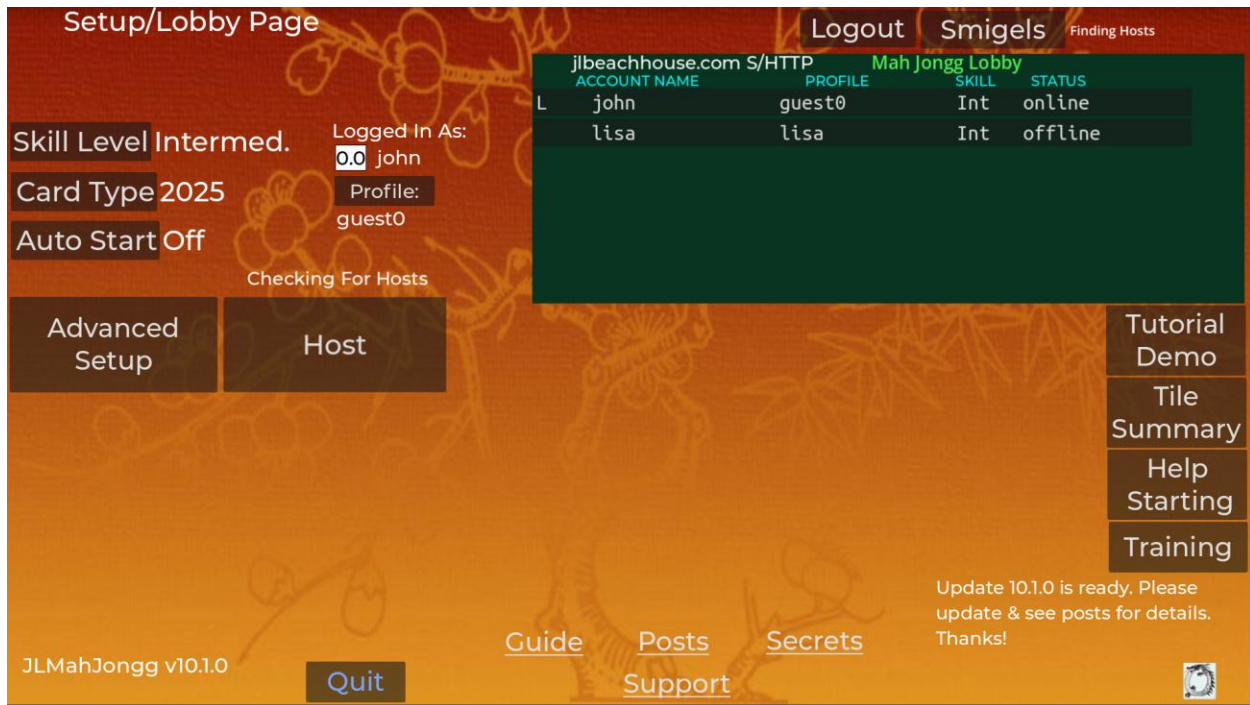


Figure C12. Lobby after defining a Player Set (Smigels example).

The app searches all users in the lobby for hosts. When a host is found, a “Hosted Games” window below the lobby shows any hosts found. You can either host a game yourself by pressing the host button (only one host per game) or connect with a host that has been found.

If you host a game by pressing the “Host” button, “Hosted Games” and “Game Players” windows are shown as in Figure C13. This example is on the host’s device. Each hosted game row/button lists the host username, default skill level, status, and the number of current game players. If there is only 1 player, then only the host has joined the game. The players currently in the host’s game are shown in the “Game Players” window. The host’s username in this example is john. An “L” for “Logged in” is shown left of your lobby listing when logged in.

player Network Enabled, Found, Hosting

Today Only

Reset

All

Hosting

MahJongg Lobby

	USERNAME	NAME	SKILL	STATUS
	bkad4375	John	pro	offline
L	john	John Smigel	pro	hosting
	biolor	Lorraine	pro	offline
	lisa	Lisa Smigel	interm.	offline

Hosted Games

USERNAME	SKILL	STATUS	# PLAYERS
john	pro	hosting	1

Game Players

POSITION	USERNAME	NAME	SKILL
East	john	John Smigel	pro

Figure C13. Hosted Games Window Example on Host without Player Connected.

An example “Hosted Games” display when the app finds a host on a different device is shown in Figure C14.

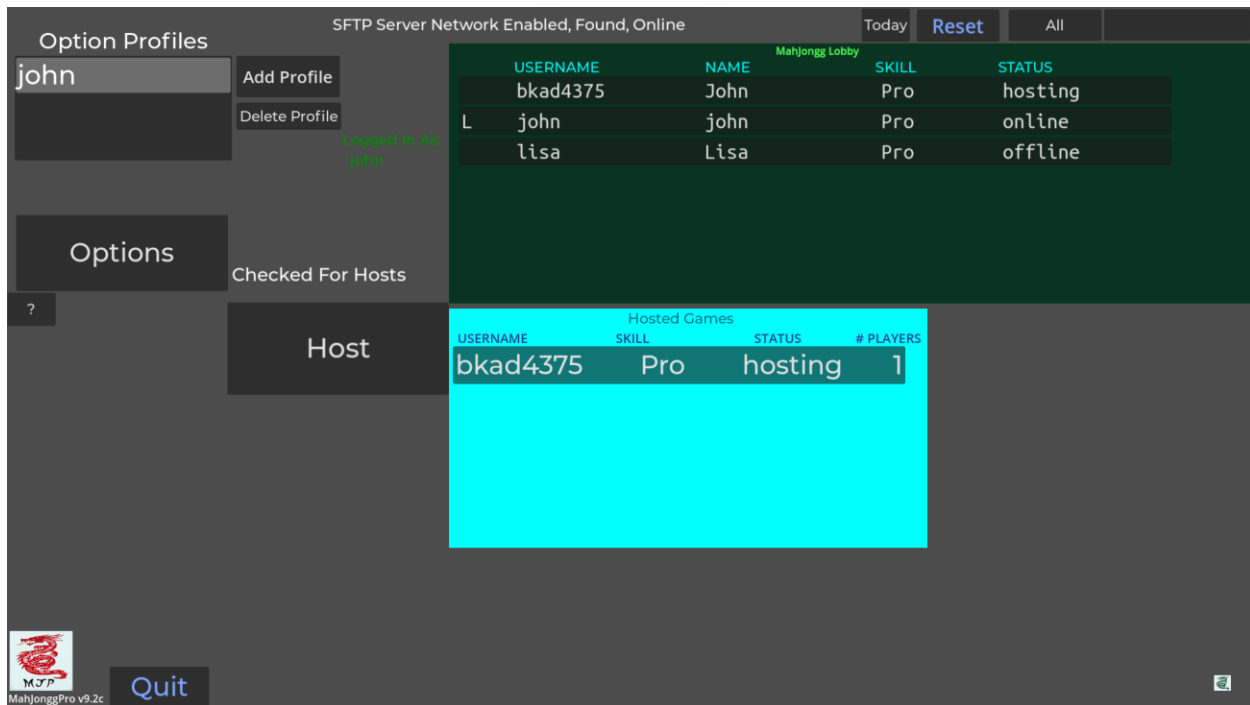


Figure C14. Hosted Games Window Example on Joining Player’s Device.

Each “Hosted Games” row is also a button that can be selected. When a hosted game is selected, a connection is made with the host and allows chatting. After a host is selected, the hosted game entry turns green (selected) and two more windows open, “Game Players” and “Chat Window.” The “Game Players” window shows all the current players. An example is shown in Figure C15. Chat window use is straight forward and is not necessary to join a game. The “Post” button must be pressed to send the chat message. Pressing Enter will just add another line to the message. The message will go to all users in your lobby that are connected to the same host. A “C” for Connected is shown to the left of a connected host. If there is a game position available, “Join as Player” and “Join as Guest” buttons are shown to potential new players as in Figure C15.

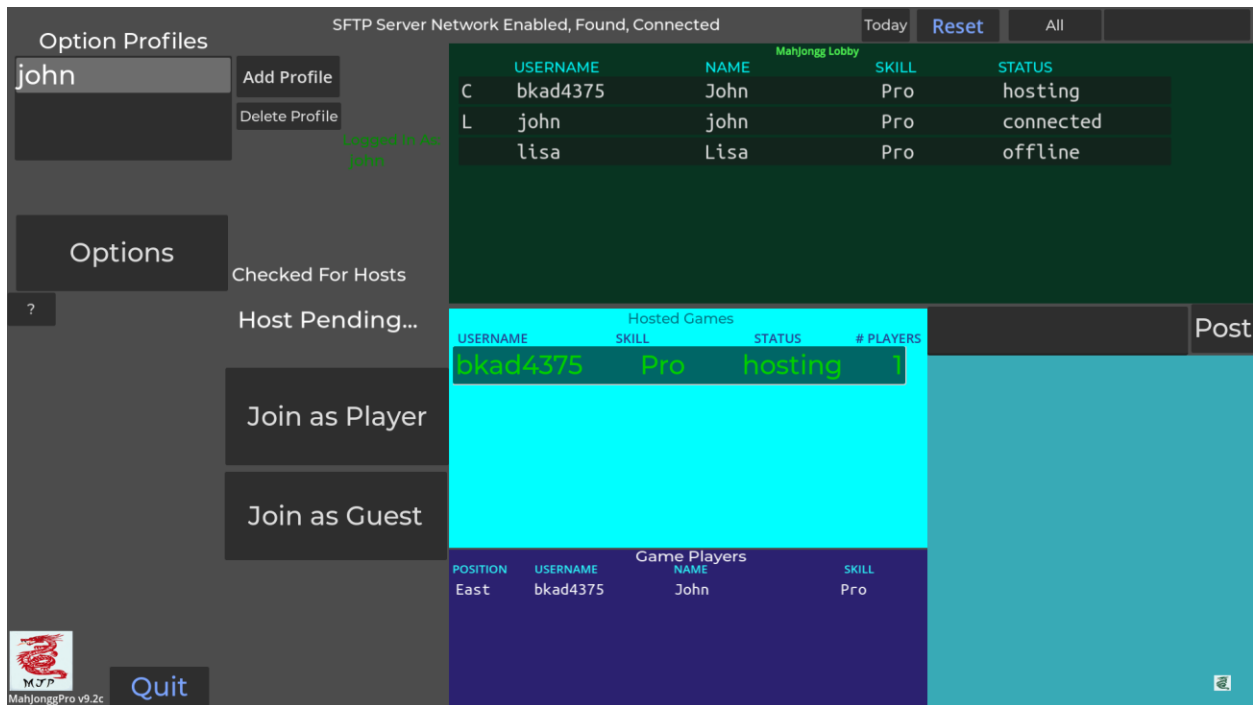


Figure C15. Game Players and Chat Window Example When Connected with a Host.

Figures C16 and C17 show host display examples when a new player or guest requests to join. A bell will ring when someone is requesting to join.

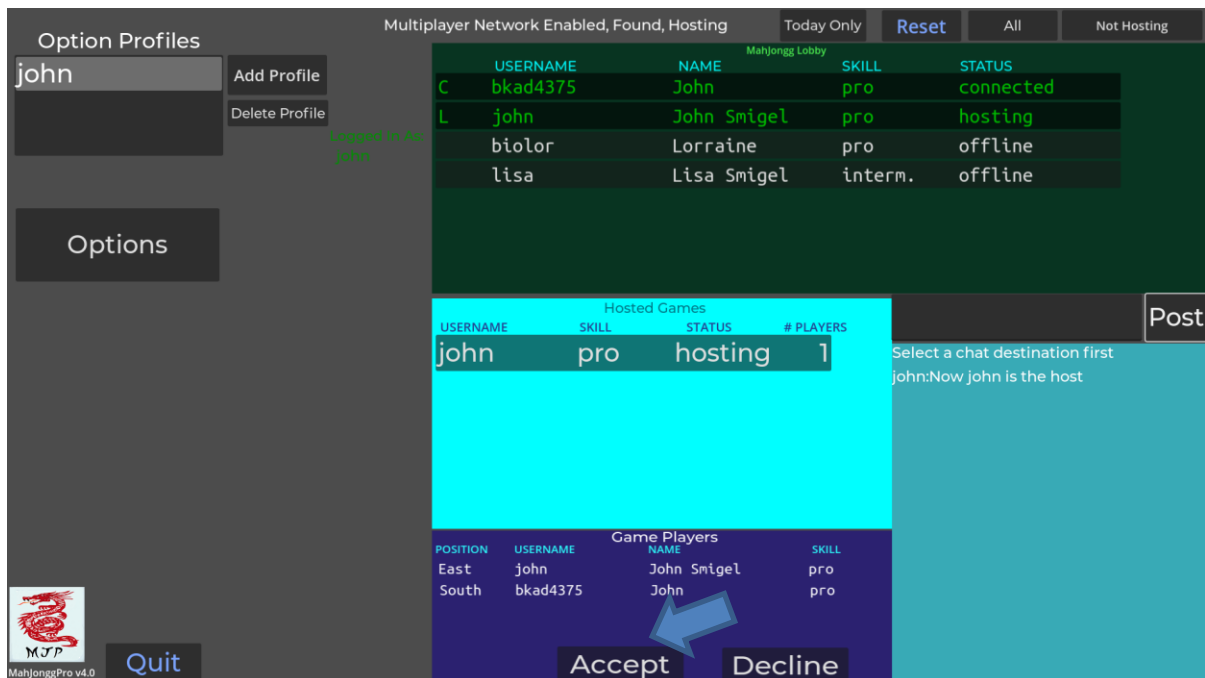


Figure C16. Host's Display when a Player Requests to Join as Player (blue arrow points to response buttons).

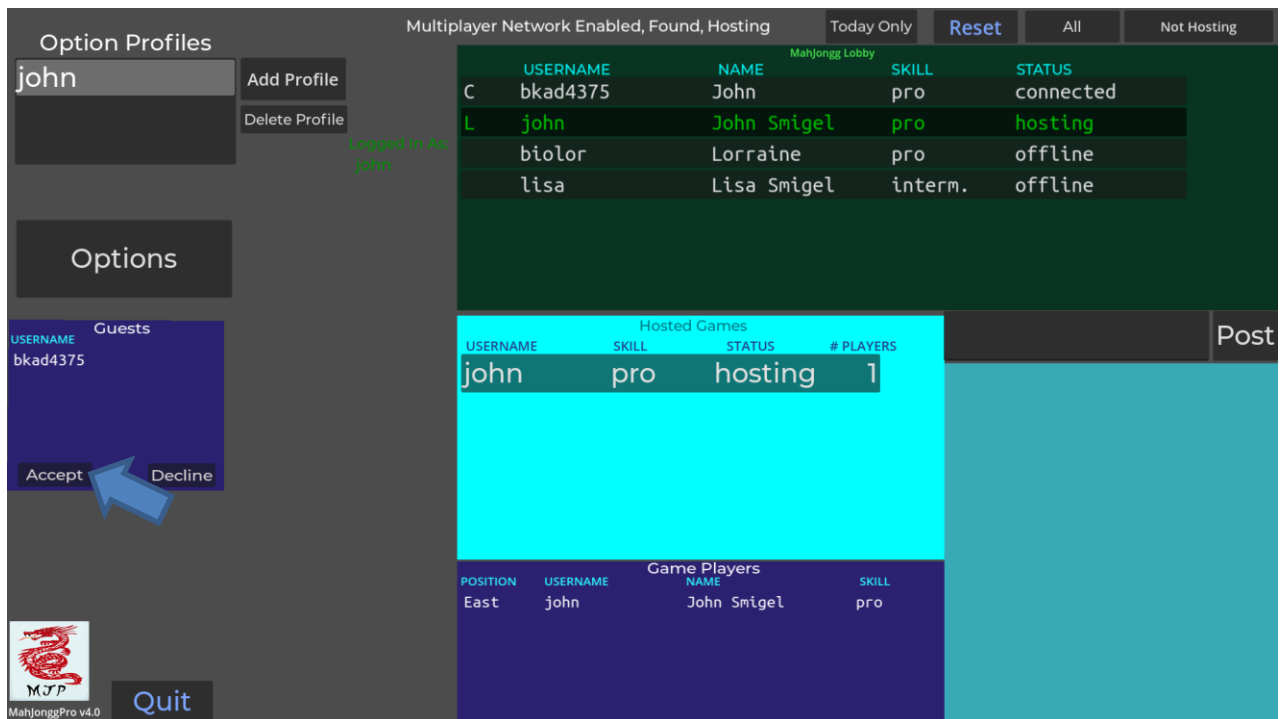


Figure C17. Host's Display when a Player Requests to Join as Guest (blue arrow points to response buttons).

Pressing “Join as Player” or “Join as Guest” brings up a join request in the Host’s “Hosted Games” or “Guest” window where he/she can accept or decline the request. If accepted, the player is either added as a guest or added to the “Game Players” windows of all players. A non-host example is shown in Figure C18. A non-host player is called client player, client, or just player.

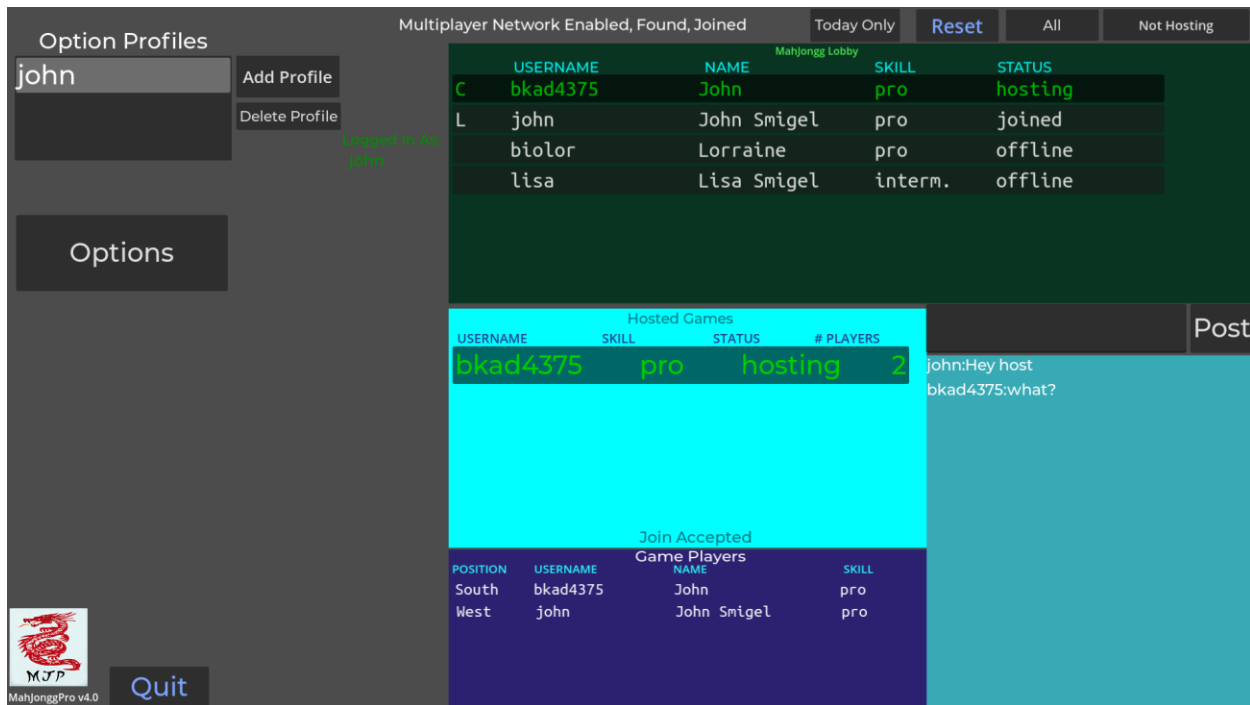


Figure C18. Player Display after Joining a Hosted Game.

After joining a host's game, some options will be limited to those selected by the host. The options that can only be selected by the host are CP Skill, CP Defense, AutoPlay, Start Position, and Card Type. These selections are temporarily disabled for clients during the game.

The host decides when to start the game. A host has a "Start New Game" button. Whichever players have joined the game when "Start New Game" is pressed, if any, will play with the host. If there are less than 4 real players, computer players play the other positions. The rest of the displays and functionality are the same as for the single player game described earlier. The host can start a single-player game if there are no other players requesting to join.

Multiplayer Game Ending. At the end of a multiplayer game, the host has the option to quit or to rotate positions and play another game. If positions are rotated, they are rotated to the right (counterclockwise, previous South becomes new East).

At the end of each game, a score summary for each game played so far can be shown by pressing the "Scores" button. An example game score summary is shown in Figure C19. In my (john's) defense, I was having one of the computer players play for me.

KEY: *=Won, E=East, J=Jokerless, P=Picked Own, G=Gave MahJongg

Game #	Score	Score CP1(CP)	Score CP2(CP)	Score CP3(CP)	Open(X) or Closed(C)	Hand Value	Group/Line	Time (min.)	Tiles Left
0	-25E	-25	100*	-50G	X	25	Consecutive Run/7	4	59
1	-50	-50E	150*P	-50	X	25	13579/4	7	23
2	0	0	0E	0				7	0
3	-100G	200*J	-50	-50E	X	25	2468/3	5	35
4	-50E	-50	-50	150*P	X	25	13579/4	4	25
5	-25	-50EG	-25	100*	X	25	13579/5	4	27
Total:	-250	25	125	100					

Figure C19. *Game Summary Display Example.*

Figure C20 shows a High and Notable Scores summary example located at the bottom of the Scores Summary display. This shows the players currently with the five highest total scores and the last players getting Mah Jongg as jokerless, closed, quints, or singles and pairs. Also shown are the overall best 3 single game scores and the best 3 total scores ever achieved.

Current Top Scores: lisa 250 | wendy 0 | nmjl1 0 | tflight1 0 | bkad4375 -75

Notable: Singles and Pairs: lisa 2024-03-21 200 | Jokerless: lisa 2024-02-17 200 |
Closed: john 2024-03-15 180 | Quints: bkad4375 2024-02-06 180 |

Overall Best Scores					
	Single Game				Total Score
bkad4375	2024-01-08	300		bkad4375	2024-01-29 1420
bkad4375	2024-01-23	270		bkad4375	2024-01-26 1395
bkad4375	2024-01-12	270		john	2024-02-23 1330

Figure C20. *High and Notable Scores Summary Example.*

Game Players Quitting: If a player quits or is disconnected, the game continues with a computer player replacing the missing player. If a host quits or is disconnected during a game, all the players still playing are converted to single-player games to finish the game.

Appendix D. Network Configuration for Multiple Players

JLMahJongg enables multiple people to play over the internet. There are 2 network options, direct internet connection and relaying using an external server. There are two other settings Off and Auto. “Off” does not need the network and “Auto” automatically selects between “Direct” and “Relay.” Multiple options are supported because no single option has all the best features or would be available to everyone. Also, the options vary in availability, speed, and stability both between different internet servers and on a particular server. The Relay option speed depends on server responsiveness. A high data rate is not required, but if the server responds slowly, the game will be slow. The direct connect option speed only depends on the connecting device’s internet speeds. Direct connect means the player’s devices communicate directly without a 3rd-party server relaying the messages. This is called Peer-to-Peer (P2P). The external server relay option relays messages between players through an external “third-party” server.

External Servers: The JLMahJongg.com server is the default for our app. To select a different server, set the Network Type to “Server,” and Net Protocol to “HTTP,” then enter the server internet address (without the http://) in the address field.

If you change the network type, you may need to restart the app.

An example network configuration display is shown in Figure D1. The network control inputs are:

- a) **Network Type** - This can be Off, Direct(D), Relay(R), or Auto.
- b) **Monitor and Timeout Periods** – Relay mod only. The Monitor and Timeout inputs set the period (seconds) between heartbeat messages and the period (seconds) before a device times out. When a host device times out, the other players become single player games. If a client device times out, it is replaced by a computer player.
- c) **LAN Prefix** – Direct mode only, the first two or more digits of any LAN IP addresses (for example: 10.0. if the LAN IP addresses are 10.0.0.XXX). This is only needed for direct connections and only if multiple players are playing on a LAN and are not using IPv6 addresses.
- d) **Use HTTPS** – If set, changes messages to/from the server from HTTP to HTTPS. (Should not be necessary)
- e) **Enable Multiple Time Zones** – Set this to ‘y’ only if you are playing another real player in a different time zone. This prevents automatically logging out the other player due to a time difference larger than the “Auto Logout” time period.

External Relay Server (R)

This option relays messages between players using Hypertext Transfer Protocol, HTTP(S). HTTPS is a secure version (encrypted), but it should not be necessary for any game messages to be encrypted. This is included in case the server requires HTTPS instead of HTTP. Small text messages are sent between players through the server for multiplayer operation.

The HTTP option is likely to be fast enough for beginner players or those just getting familiar with the JLMahJongg app. The HTTP server option can use public web servers that run internet web sites. HTTP is likely to be available and can connect with anyone with an internet connection. If the HTTP protocol is not fast enough, Direct can be used, if available.

Direct Connection (D)

The direct option connects the players’ devices directly using the internet.

Each client player exchanges messages only with the host. The host device acts as a server and controls communication between all players. The direct configuration setup is shown in Figure D3. The devices’ internet addresses are determined automatically by JLMahJongg. It may take longer to establish the direct connection due to the communication sequence required; however, the game is fast after the connections are made.

Off (None or Offline)

This network option lets you play against 3 computer players, even if there is no internet connection available. Your scores are not recorded on the public scoreboard if the server is not available. JLMahJongg automatically switches network type to “Off” if it cannot connect to the JLMahJongg server.

JLMahJongg Multiplayer Game Administration

An internet server is made a JLMahJongg server by uploading several small PHP scripts. These scripts handle all game communication. The server needs to be available via HTTP(S).

JLMahJongg game administration uses a version of the Player Sets and Data display. A non-administration version of this display is used to log in or out of the game.

Administrators control who has game access and user’s initial account information. Administrators should password-protect their accounts.

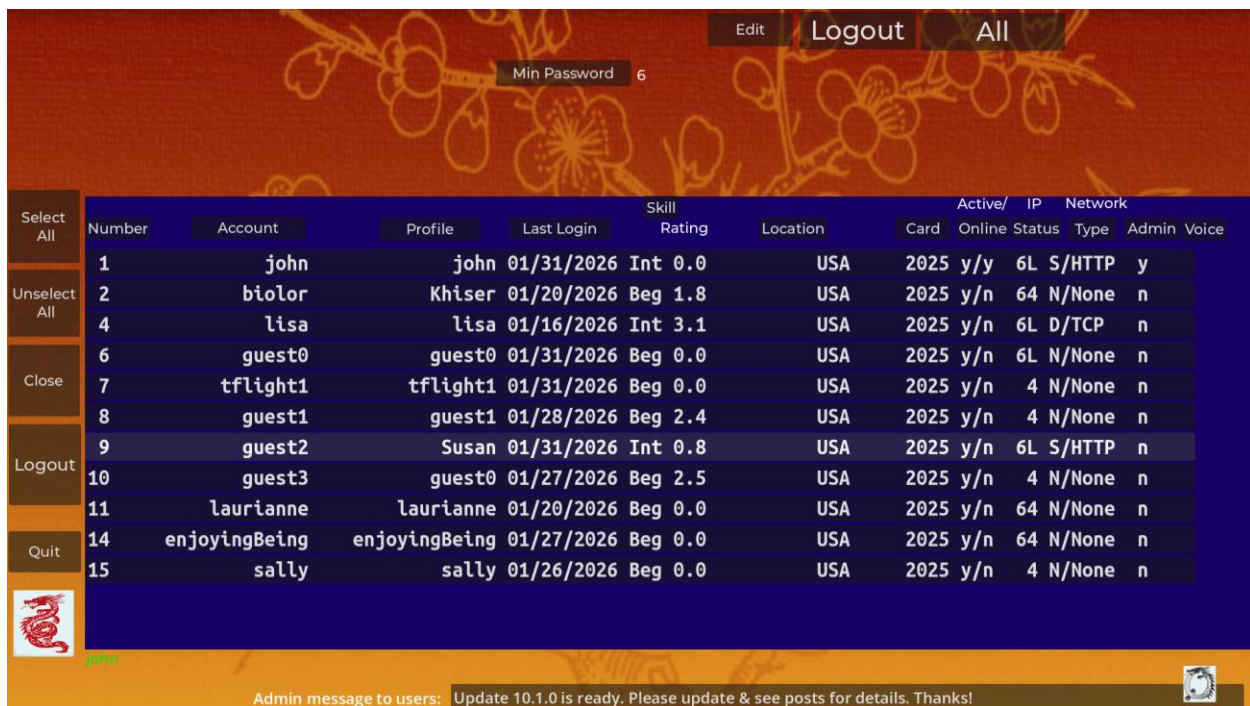
An example administration display is shown in Figure D5. The blue area shows data for all current accounts. You can sort on a column by clicking on the column heading. The columns are:

- a) **Number:** A unique ID number assigned to each user. Numbers 0 and 1 are always administrators.
- b) **Account:** Account being used or last used. Case matters except for the first character.
- c) **Profile:** User profile name (last or current user if for a Guest account)
- d) **Last Login:** Last date of app login
- e) **Skill Level and Rating:** Skill level to help match players with similar skill and speed. Skill rating is user’s skill (quantified from 0 to 10) estimated from play history.
- f) **Location:** Geographical location
- g) **Cards:** Card name that is currently used
- h) **Active/Online:** Indication if the user is active (played recently) and currently online
- i) **IP Status:** User’s internet address types available (6=IPv6, 4=IPv4, L=On Same Local Area Network (LAN), off=not currently accessible)
- j) **Network Name:** Name assigned to a Server
- k) **Network Type:** User’s last network type
- l) **Admin:** Is the user an admin?

Administration functions include:

Min Password – The minimum required number of password characters for non-admin users is set here between 0 and 6. If set to 0, no password is required. This is set from an administrator display button, Figure D5.

App Updates: The app does not automatically update itself; however, the administrator can set the latest version number on the web site so users are notified if a newer version is available. If available, the new version number is shown above the logo at the lower left of the lobby. An administrator can also post a message to all users using the bottom of the Figure D5 display. The message is displayed in the lobby when a user logs in. If necessary, the administrator can require users to update above a specific version before being allowed to play. A message can be sent to the chat window of players that go directly to a game indicating they need to upgrade.



	Number	Account	Profile	Last Login	Skill Rating	Location	Card	Active/Online	IP Status	Network Type	Admin	Voice
Select All	1	john	john	01/31/2026	Int 0.0	USA	2025	y/y	6L	S/HTTP	y	
Unselect All	2	biolor	Khiser	01/20/2026	Beg 1.8	USA	2025	y/n	64	N/None	n	
	4	lisa	lisa	01/16/2026	Int 3.1	USA	2025	y/n	6L	D/TCP	n	
Close	6	guest0	guest0	01/31/2026	Beg 0.0	USA	2025	y/n	6L	N/None	n	
	7	tflight1	tflight1	01/31/2026	Beg 0.0	USA	2025	y/n	4	N/None	n	
	8	guest1	guest1	01/28/2026	Beg 2.4	USA	2025	y/n	4	N/None	n	
Logout	9	guest2	Susan	01/31/2026	Int 0.8	USA	2025	y/n	6L	S/HTTP	n	
	10	guest3	guest0	01/27/2026	Beg 2.5	USA	2025	y/n	4	N/None	n	
	11	laurianne	laurianne	01/20/2026	Beg 0.0	USA	2025	y/n	64	N/None	n	
Quit	14	enjoyingBeing	enjoyingBeing	01/27/2026	Beg 0.0	USA	2025	y/n	64	N/None	n	
	15	sally	sally	01/26/2026	Beg 0.0	USA	2025	y/n	4	N/None	n	

Admin message to users: Update 10.1.0 is ready. Please update & see posts for details. Thanks!

Figure D5. Administration Display.

Enter
Edit
Logout
All

Min Password 6

Profile: john
Location: USA
Password:

	Number	Account	Profile	Last Login	Skill Rating	Location	Card	Active/Online	IP Status	Network Type	Admin	Voice
Select All	1	john	john	01/31/2026	Int 0.0	USA	2025	y/y	6L	S/HTTP	y	
Unselect All	2	biolor	Khiser	01/20/2026	Beg 1.8	USA	2025	y/n	64	N/None	n	
	4	lisa	lisa	01/16/2026	Int 3.1	USA	2025	y/n	6L	D/TCP	n	
Close	6	guest0	guest0	01/31/2026	Beg 0.0	USA	2025	y/n	6L	N/None	n	
	7	tflight1	tflight1	01/31/2026	Beg 0.0	USA	2025	y/n	4	N/None	n	
	8	guest1	guest1	01/28/2026	Beg 2.4	USA	2025	y/n	4	N/None	n	
Logout	9	guest2	Susan	01/31/2026	Int 0.8	USA	2025	y/n	6L	S/HTTP	n	
	10	guest3	guest0	01/27/2026	Beg 2.5	USA	2025	y/n	4	N/None	n	
	11	laurianne	laurianne	01/20/2026	Beg 0.0	USA	2025	y/n	64	N/None	n	
Quit	14	enjoyingBeing	enjoyingBeing	01/27/2026	Beg 0.0	USA	2025	y/n	64	N/None	n	
	15	sally	sally	01/26/2026	Beg 0.0	USA	2025	y/n	4	N/None	n	

john

IPP: 6 IP4: 73.249.142.35 IP6: 2601:19e:4000:705b:e495:d786:ccc5:adbb LAN IP: 10.0.0.39 On LAN: true

Admin message to users: Update 10.1.0 is ready. Please update & see posts for details. Thanks!

Figure D6. Administration Display Example when Editing the Administrator’s Own Data. Other users’ data need to be edited directly in the server files.

Appendix E. JLMahJongg Card Generation

JLMahJongg features the ability to create your own lists of winning hands (cards) used to play American Mah Jongg. You can define two types of cards: 1) National Mah Jongg League (NMJL) Standard, and 2) JLMahJongg Custom. You can only store one of each card type, standard and custom, at a time. Note that deleting the browser storage (cookies) will delete the card data for the browser version and you will have to enter the card again. Card data for the standard 2025 card can be selected. You will not be able to view a standard NMJL card in the app unless you enter it using the card editor.

The host can send a custom card automatically to other players.

We define a language called Mah Jongg Card Language (MJCL) that is used to enter custom or standard cards into JLMahJongg. This language and how to enter cards are described in this appendix. We have attempted to make the card language match the standard card format as closely as possible. It can take less than 15 minutes to enter a card and this should only need to be done once a year when a new standard card is distributed. I may be willing to type in a card for you if you have one and I can access your device. You should only need to enter a standard card once a year.

A card has 3 things: 1) card name, 2) card categories, and 3) lines in each category. You enter these into JLMahJongg using its Card Editor. Most of what you input defines the lines on the card.

Each line can have either 1 or 2 base patterns that define the winning hands for that line. The base patterns are what you see on a standard printed card. Each base pattern contains sets of tiles. The number of tiles in each base pattern must equal 14, the number of tiles in a winning hand.

Each line contains the following:

- A) Sets in the hand – each set has a specified number of tile types. Tile types are: numbers 1 to 9; Dragons, D for any suit, or G for Green, R for Red, and o (zero, not O) for White; Flowers, F; and Winds, N E W & S. Numbers and dragons have suits that must be specified if the sets are not all the same suit. Flowers and winds do not have a suit, so no suit specifier is needed for these. There can be up to two base patterns on a line that are separated by either the OR character (| “the shift \ on the keyboard”) or the letter o (lower case O). Note that spaces can be used to make the sets and lines clearer, but are not needed.
- B) Expander codes – expander codes indicate how the base pattern of sets is repeated to generate multiple hands represented by the base pattern. The codes correspond to some of the text in parentheses on a standard card line.
- C) Exposed (X) or Closed (C) hand indicator (**NOTE: X must be upper case**)
- D) Base hand value

Specifying suits. The number of specific suits is specified by indicating each set's color by preceding it with a letter for the color: green (g), red (r), or blue (b). The default color is green (g) and does not need to be entered if it is the first color. Sets with different colors need to be different suits. Sets with the same color need to be the same suit. The suit starts out as the default, green, if it is not specified. The suit will stay the default until a new color is specified on the line. If a set needs to be specified as a specific suit, it can be preceded by a specific character for the suit (m=bam, c=crak, d=dot). NOTE: Bam is NOT "b" because "b" is used for the color blue. Specific suits are rarely used on standard cards (other than o for white dragon in year categories).

Expander Codes. The expander codes cause the pattern to be replicated according to the expander code (except the default T=These numbers only). This corresponds to some of the wording explaining the line on standard cards. The expander code options are:

T = These numbers only – does not expand (default),

Ichr = Like singles defined by chr (the single set marked by the first character in chr will also be replaced by all the following characters in chr. For example, **INEWS** (chr=NEWS) replaces a single North, N, with the additional winds E, W, and S.

The below expanders work similarly to the above Ichr for different size sets:

Achr = Like pairs defined by chr,

Pchr = Like pungs (sets of 3) defined by chr,

Kchr = Like kongs (sets of 4) defined by chr,

Qchr = Like quints (sets of 5) defined by chr,

Zchr = Like (any set sizes) - any set sizes defined by chr, (for example, **ZENWS**, replace any set sizes of E with the additional winds N, W, and S,

Lchr = Like numbers (replaces pattern number 1 (or 2 if even numbers) by 1 to 9, or if chr is "o" or "e" replaces by odd or even numbers only),

Uchr = Unlike number sets (chr = I, A, P, K, or Q followed by the 2 tile types replaced by the unlike numbers). For example, **UK18** means kong sets with 1's and 8's replaced by any 2 unlike numbers between 1 and 9),

Vchr = Consecutive run (replaces consecutive number runs starting with 1 (or 2 if even run) by all possible runs up to ending with 9). Can use chr as "a," "o," or "e" for all, odd, or even number runs.

***snum** = Wild card for suit on sets in the list given by snum. Note that the set number starts at zero and only sets up to number 9 (single digit set number) can be set as a wild suit (any suit). This expander code is used along with the code, “a” before the sets that can be any suit. This “a” code shows the “wild” sets that can be any suit in color purple.

>chrs = Replace a specific set number with a set of alternate values. The code, chrs, is the set number to be replaced followed by the values to replace (see comments on * above).

Ychrs = Replace pairs after the first pair with the specified value. The code chrs can be “o” for odd numbers, “e” for even numbers, or a specific set of values.

Hchrs = Set each of the set numbers in the range defined by chrs to a pair, one at a time. Each of the other sets in the range is set to a single. The first set in the range needs to be initialized to a pair.

= Sets of different numbers are used in any order, regardless of set size. Currently implemented only for 3 different number sets (for example, 3,6,9).

~ = Opposite winds (if have NN and SS, replace with EE WW or vice versa).

!chrs = restrict like numbers, unlike numbers, or a run to only numbers in chrs. Note that this is not a separate expander stage (limited to 2 stages), but modifies a like, unlike, or run stage. This code must come first before any other expander codes.

For some examples of how these expanders are used, see the below values for the 2025 card. If you are brave enough to try to use our card editor and Mah Jongg Card Language (MJCL) to enter the 2025 card, here are some expander code hints:

Consecutive run line 7: H01234 Va

Winds – Dragons line 2: *123 Va

Winds – Dragons line 5: Lo

Winds – Dragons line 6: Le

Singles and Pairs line 3: >6369

Singles and Pairs line 5: Yo

Current Expander Code Restrictions: I sometimes don’t implement an expander code combination until it is needed for a specific standard or custom card we are supporting. The editor is limited to 2 sequential expander stages. A single first stage

can be any of the expander options. The L and Y stages cannot currently have a second stage. The only expander options that can currently be used for a second stage are: K, V, Z, U, *, L, and Y. If two stages are used sequentially, the order should not matter as long as the above two restrictions are satisfied.

Example Card Definition. Below is the MahJongg Card Language code for the Basic1 card defined in Appendix A.

Basic1

"2468"

FF 222 444 666 888 X25

222 4444 r666 8888 X25

22 444 r66 888 bDDDD X30

"Like Numbers"

FF 1111 NEWS DDDD L X25

FF 1111 NEWS r1111 L X25

FF 1111 r1111 b1111 L X25

"Consecutive Run"

111 222 333 44 DDD Va X25

111 2222 r333 4444 Va X25

FFF 1111 r2222 b333 Va X25

"13579"

11 333 5555 777 99 X25

11 333 55 r55 777 99 X25

FF 111 r33 55 77 b999 X30

"Winds/Dragons"

NNNN EEEE WWWW SS X25

FF 111 DDD rDDD bDDD Va X25

FFFF EEE 1111 WWW V X25

FFF DDDD rDDD bDDDD X25

FF NNN EEE WWWW SSS C30

"369"

FFF 333 6666 9999 X25

333 6666 r666 9999 X25

FF 333 666 999 DDD X25

"Singles & Pairs"

FF 11 22 33 44 55 66 Va C50

NN 11 22 33 44 55 66 Va C50

SS 11 22 33 44 55 66 Va C50

DD 11 22 33 44 55 66 Va C50

The Basic1 card that this code produces (from Appendix A) is:

Basic1 Mah Jongg Card

		VALUES
Group 1: 2468 (Even Numbers)		
Line 1: FF 222 444 666 888	(any 1 suit)	X 25
Line 2: 222 4444 666 8888	(any 2 suits)	X 25
Line 3: 22 444 66 888 DDDD	(any 3 suits)	X 30
Group 2: Like Numbers		
Line 1: FF 1111 N E W S DDDD	(any 1 suit, matching Dragons)	X 25
Line 2: FF 1111 N E W S 1111	(any 2 suits)	X 25
Line 3: FF 1111 1111 1111	(3 suits)	X 25
Group 3: Consecutive Run		
Line 1: 111 222 333 44 DDD	(any 1 suit, any 4 cons. #'s, matching Dragons)	X 25
Line 2: 111 2222 333 4444	(any 2 suits, any 4 consecutive #'s)	X 25
Line 3: FFF 1111 2222 333	(3 suits, any 3 consecutive #'s)	X 25
Group 4: 13579 (Odd Numbers)		
Line 1: 11 333 5555 777 99	(any 1 suit)	X 25
Line 2: 11 333 55 55 777 99	(any 2 suits)	X 25
Line 3: FF 111 33 55 77 999	(3 suits)	X 30
Group 5: Winds/Dragons		
Line 1: NNNN EEEE WWWW SS		X 25
Line 2: FF 111 DDD DDD DDD	(any No., 3 dragon sets, 3 suits)	X 25
Line 3: FFFF EEE 1111 WWW	(any No., any 1 suit)	X 25
Line 4: FFF DDDD DDD DDDD	(3 suits)	X 25
Line 5: FF NNN EEE WWW SSS		C 30
Group 6: 369		
Line 1: FFF 3333 6666 9999	(any 1 suit)	X 25
Line 2: 333 6666 666 9999	(any 2 suits)	X 25
Line 3: FF 333 666 999 DDD	(any 1 suit, matching Dragons)	X 25
Group 7: Singles & Pairs		
Line 1: FF 11 22 33 44 55 66	(any 1 suit, any 6 consecutive #'s)	C 50
Line 2: NN 11 22 33 44 55 66	(any 1 suit & North, any 6 consecutive #'s)	C 50
Line 3: SS 11 22 33 44 55 66	(any 1 suit & South, any 6 consecutive #'s)	C 50
Line 4: DD 11 22 33 44 55 66	(any 1 suit, any 6 cons. #'s, matching Dragon)	C 50

Card Editor Interface

The card editor is accessed from Advanced Setup by pressing the “Card Editor” button. The “Card Editor” button will only be available if your skill level is set to higher than “Beginner” and you are not currently in a game (may need to enable the network).

A card editor display will be shown. What is shown depends on the number of previously-stored cards. If no cards are saved (first time using the editor), then a blank editor is shown as in Figure E2. The editor starts with three drop-down boxes:

- 1) Card Type – Either “Standard” or “Custom”: Determines type of card being created or edited.
- 2) Mode – Either “Enter” or “Edit”: Determines if you are entering new categories or lines (Enter) or editing an existing category or line (Edit).
- 3) View – Either “Code” or “Card”: “Code” view shows the MJL code as entered or “Card” view shows what the card will look like when viewed in the game or printed.

Depending on your device type and operating system, your display may not look exactly like the ones shown here. In particular, the drop-down boxes might not show the down arrow on the right indicating it has a drop-down menu. Even if the arrow is not shown, you can still click in or select the box to show the menu.

The “Close” button in the middle closes the editor window and returns to the lobby.

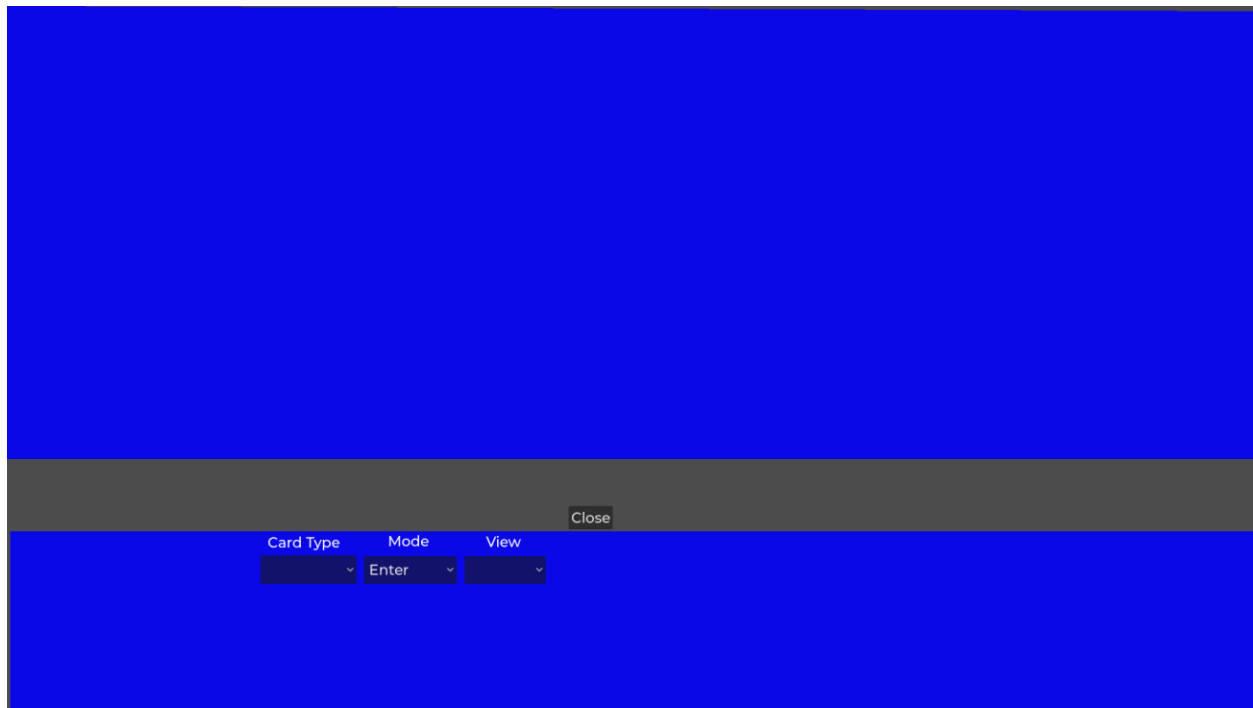


Figure E2. *Card Editor Screen with No Saved Cards.*

To start entering a card, first select the card type from the “Card Type” drop-down box. You can select either Custom or Standard. Figure E3 shows the display after selecting a standard card. The process for entering and editing standard and custom cards is the same.

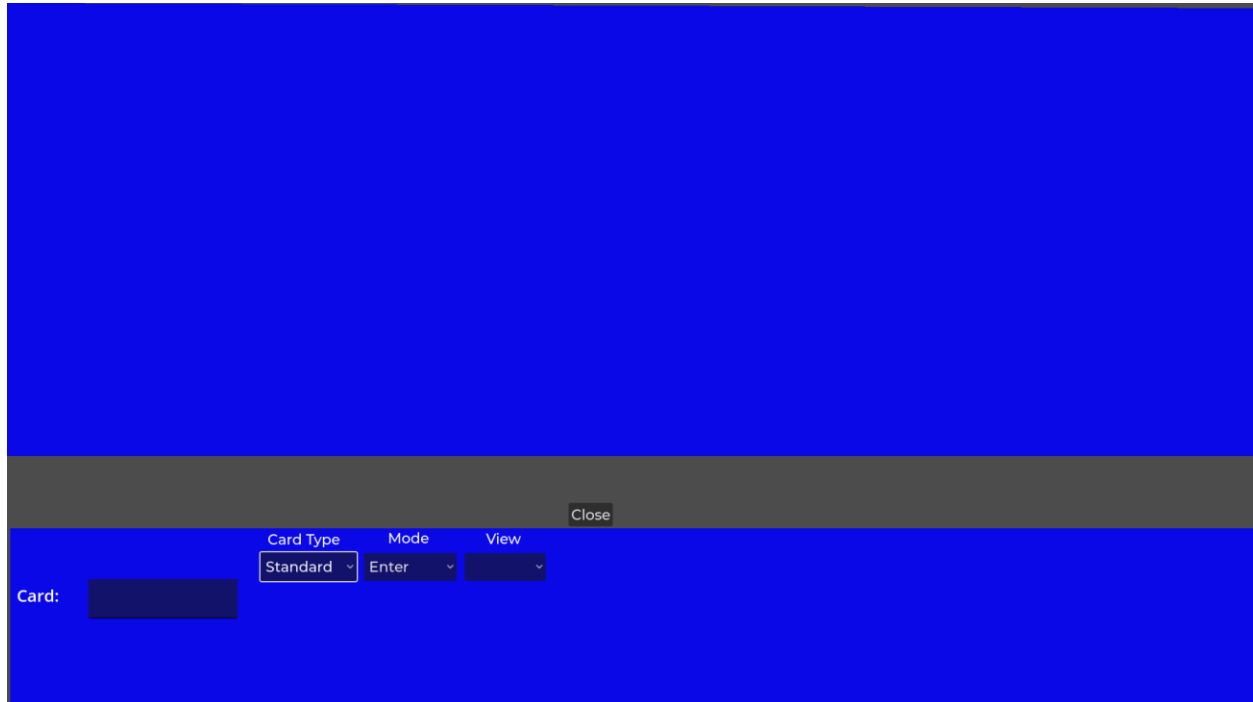


Figure E3. *Editor with Standard Card Selected, Ready to Enter Card Name.*

Next enter the card name in the Card box and press Enter. For this example, we show starting to enter a “2024” card. The display after entering the name is shown in Figure E4. Note that the editor mode is set to “Enter.” The “Enter” mode is used when adding new categories or lines to a card.

The screenshot shows a web-based interface for editing a Mahjongg card. At the top, there is a dark grey header bar with a 'Close' button on the right. Below the header, the interface has a blue background. On the left, there are two input fields: 'Card:' with the value '2024' and 'Group:' with an empty text box. To the right of these fields are three dropdown menus: 'Card Type' set to 'Standard', 'Mode' set to 'Enter', and 'View' set to a blank dropdown. The entire interface is enclosed in a thin blue border.

Figure E4. *Example Card Editor Standard Card Entry with Card Named “2024”.*

Next enter the first category name in the Group box and press Enter. The first 2024 card category is called “2024” and is shown entered in Figure E5.

The editor mode has automatically changed to “Edit”.

Also, the “View” has automatically been set to “Code.” There are 2 view types: 1) Card, and 2) Code. The Code view shows the Mahjongg Card Language code as you have entered it. The “Card” view shows how the card will look when formatted for display/printing or during play. You can switch between Code and Card view at any time using the drop-down box under “View.” You can use either view, but Code view is more useful for creating or editing a card.

Buttons named “Codes” and “Process” buttons are now shown. The “Codes” button pops up a reference list of expander codes. An example is shown [here](#). The “Process” button evaluates the card and generates the number of unique hands defined by the whole card, each category, and each line. These values are displayed when a line is selected if the card has been processed. You only need to use the “Process” button if you want to see these card statistics. An example is shown [here](#). The “Process” button is shown here because you can see the card statistics for this 1-line card. A card with a single category and line is a valid card.

Figure E5. *Card Editor after the First Group Called “2024” is Entered.*

When the new category name is entered, the category and a default line are shown in the card display at the top. The default View when entering a new card is “Code” view. The purpose of the default line is to make sure you can select the 2024 category. Only lines can be selected, not categories. To select a category, you must click on a line in that category. Therefore, all categories must always have at least one line. If a category without a line were created and then a different category was selected, it would not be possible to edit or delete the empty category and you would need to delete the whole card and start again. The default line prevents this potential problem. The default line is “FF NNNN EEEE WWWW X25”. When the new category is entered:

- 1) The selected category and a blank line are shown in the “Group:” and “Line:” boxes, respectively.
- 2) The empty Line: box is selected so it is ready to accept a new line.
- 3) The Code display shows the new category and line in red, indicating they are the current selection.
- 4) Buttons called “Delete Line” and “Delete Group” are now shown.

The default line is not what we want, so we need to change it to the actual first line. You just need to enter the line you want to replace the default line and press Enter. The resulting display before pressing Enter is shown in Figure E6.

Because a specific line and category are selected, they can now be deleted, if desired. If there is only one line in a category, deleting the last line deletes the category.

We need to change the default line to the actual first line of the 2024 category on the 2024 card. This first line is: “222 000 r2222 4444 X25”. The only difference between this code and the actual line on the card is that the letter “r” is used to indicate the sets following the “r” are red (they are printed in red on the physical card). The “X25” on the line is the default, so that does not need to be typed in.

Figure E6 shows this correct first line typed in, but not entered yet. Figure E6 is before the line is entered by pressing Enter. You can modify the line until you enter it.

The screenshot shows a software interface for editing a card. At the top, there is a list of categories with '2024' selected. Below this, there is a large empty area for the card content. At the bottom, there is a form with the following fields and buttons:

- Card:** 2024
- Group:** 2024
- Line:** 222 000 r2222 4444
- Buttons:** Close, Card Type (Standard), Mode (Edit), View (Code), Codes, Process, Delete Line, Delete Group

Figure E6. *After Typing the New Line, but not Entered Yet.*

Figure E7 shows the display after entering the first line shown in the “Line:” box of Figure E6. The correct line is now displayed in the Code view, the mode returns to Enter, and the “Line:” box is cleared. The editor is now ready to accept additional lines for this new category.

The screenshot shows the Card Editor interface. At the top, there is a list of lines: 2024 (green), 2024 (red), and 222 000 r2222 4444 X25 (red). The main area is a large blue box. At the bottom, there is a control bar with a 'Close' button, dropdown menus for 'Card Type' (Standard), 'Mode' (Enter), and 'View' (Code), and buttons for 'Codes' and 'Process'. Below these are input fields for 'Card:' (2024), 'Group:' (2024), and 'Line:' (empty).

Figure E7. *Card Editor after Entering the New First Line.*

You can continue entering more lines by entering additional lines in the “Line:” box. Note that after each new line entered, you need to click again in the “Line:” box before entering the next line. (I haven’t figured out how to fix this yet.) We’ll show adding the 2nd 2024 category line, “FFFF 2222 0000 r24”. The resulting display is shown in Figure E8.

The screenshot shows the Card Editor interface with two lines entered. The list at the top now includes: 2024 (green), 2024 (red), 222 000 r2222 4444 X25 (red), and FFFF 2222 0000 r24 X25 (red). The control bar at the bottom now includes additional buttons for 'Delete Line' and 'Delete Group'. The 'Card:' field is 2024, the 'Group:' field is empty, and the 'Line:' field is empty.

Figure E8. *Card Editor with 2 Lines Entered.*

If you select the “View” drop-down and then select “Card”, the display looks like Figure E9. The card view looks like a printed card would look. The sets are shown with the correct colors that indicate how many different suits are used.

This “Card” view for the card in use can be popped up during a game using the menu option “View Card”.

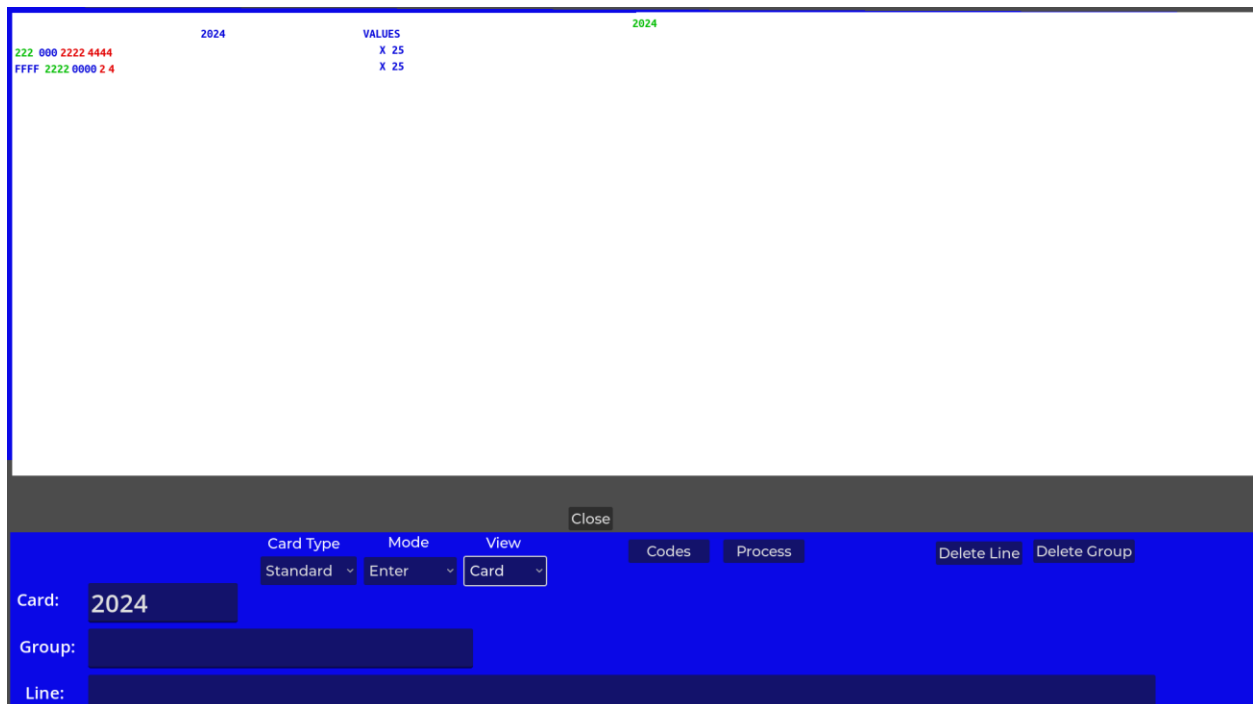


Figure E9. *Example Card View (only 2 lines).*

The other thing you need to do to enter a new card is add additional new categories. Without adding the rest of the lines for the 2024 category, we’ll show how to add the next category, “2468”. You can do this in either view, but we recommend entering new code in “Code” view. When in the Enter mode and the last line is selected (as in Figure E8), to enter a new category at the end, add the new category name in the “Group:” box. You can only enter either a new category or a new line – you can’t enter both a new category and a new line at the same time. To enter the new category name, click in or select the “Group:” box and enter the name, “2468” in this case. Press Enter to enter the new category name and create the new category. The result is shown in Figure E10.

The screenshot shows a data entry interface with a blue header bar and a white main area. The header bar contains a 'Close' button. The main area displays the following text:

```

2024
2024
222 000 r2222 4444 X25
FFFF 2222 0000 r24 X25
2468
FF NNNN EEEE WWWW X25

```

Below the main area, there is a control bar with the following elements:

- Card Type: Standard (dropdown)
- Mode: Edit (dropdown)
- View: Code (dropdown)
- Buttons: Codes, Process, Delete Line, Delete Group

At the bottom, there are input fields for Card, Group, and Line:

- Card: 2024
- Group: 2468
- Line: (empty)

Figure E10. *Second Group Added.*

As in the first category, type the first line of the second category and press Enter. The result is shown in Figure E11.

The screenshot shows the same data entry interface as Figure E10, but with the following changes:

- The 'Mode' dropdown is now set to 'Enter'.
- The 'Line' input field now contains the text: 222 444 6666 8888 | 222 444 r6666 8888 X25

The main area text remains the same as in Figure E10.

Figure E11. *First Line of Second Group Added.*

To finish adding the rest of a new card, repeat the same steps above until all categories and lines are entered. When you are done, just close the editor. The card is automatically saved whenever you make a change. The card will be automatically processed, if necessary. What you see in the View displays is what is stored.

General notes about using the editor:

1. The card is automatically saved every time you make a change.
2. The “Codes” button pops up a reference list of expander codes
3. The “Process” button calculates how many unique hands are produced by each line. After processing is complete, the editor will show the number of unique hands generated by each line, category, and the whole card. To see these numbers, select a line. You don’t need to “Process” unless you want to see these card statistics.
4. Most line entries can be entered in either lower or upper case with the following exceptions: X for eXposed needs to be upper case and x for multiply needs to be lower case; o for odd is lower case, e for even is lower case, E for East is upper case.
5. The X or C designating either an eXposed or Closed hand and the hand value default to “X 25.” You only need to enter these if they are different than the default.
6. Press the close button to close the editor window and return to the lobby.
7. The “Line:” box must be reselected after each new line is entered.

Starting the Editor with an Existing Card to Modify the Card or Correct Mistakes

When the editor starts with one (standard or custom) saved card, the editor shows that card. When the editor starts with two (standard and custom) saved cards, the editor shows the standard card. You can switch to the other type card using the Card Type dropdown.

An example after opening with an existing custom card is shown in Figure E12. The editor opens in Edit mode and Card view. There are 3 things you can do to an existing card:

- 1) Change or correct an existing category, line, or the card name
- 2) Add a new category or line
- 3) Delete a category, line, or the whole card.

The following describes editing an example existing card named “CardEx”.

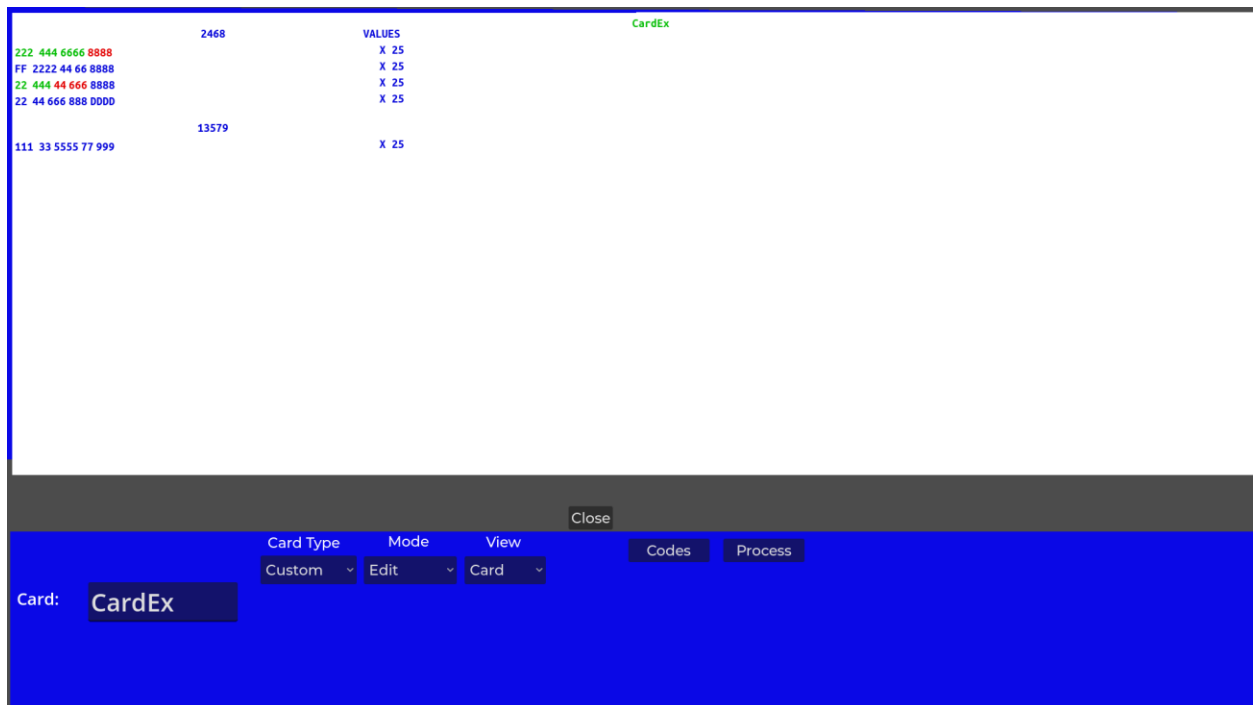


Figure E12. *Example Existing Custom Card in Card View.*

Changing a Group or Line

To change an existing category or line, first select the category and line either by selecting the left set when in card view or the line when in code view. If you select the third line of the 2468 category, the card display is shown as in Figure E13. The selected category and line are shown in the Group: and Line: boxes.

VALUES		CardEx
222 444 6666 8888	X 25	
FF 2222 44 66 8888	X 25	
22 444 44 666 8888	X 25	
22 44 666 888 DDDD	X 25	
111 33 5555 77 999	X 25	

Close

Card Type

Mode

View

Custom

Edit

Card

Codes

Process

Delete Line

Delete Group

Card: CardEx

Group: 2468

Line: 22 444 r44 666 b8888 X25

Figure E13. Display after selecting the 3rd Line.

For example, if we want to make the blue 8's in this line red, we can remove the "b" before the 8888 in the line code. To do this just edit the text in the "Line:" box and press Enter. The display changes to that shown in Figure E14. The blue 8's in the third line are now red.

VALUES		CardEx
222 444 6666 8888	X 25	
FF 2222 44 66 8888	X 25	
22 444 44 666 8888	X 25	
22 44 666 888 DDDD	X 25	
111 33 5555 77 999	X 25	

Close

Card Type

Mode

View

Custom

Enter

Card

Codes

Process

Card: CardEx

Group: 2468

Line:

Figure E14. Display after changing the blue 8's to red 8's in the 3rd line.

After entering the change, the editor is ready to enter a new line after the changed line. In the Card view, you can no longer see which line is selected until a line is selected again. If you enter a new line at this point, the editor will switch to code view and show the new selected line in red.

Changing the Card Name

To change the card name:

1. Enter the new card name in the “Card:” box and press or select Enter.

Entering a New Group

To enter a new category:

1. Select the last line of the last category for a category at the end or select any line in the category after where you want the new category otherwise,
2. Change to enter mode with the Mode drop-down box,
3. Type the new category name in the Group: box and select or press Enter,
4. Modify the placeholder line, “FF NNNN EEEE WWWW”, that is added with the new category.

Entering a New Line

To enter a new line:

1. Select the line before where you want the new line
2. Change to enter mode with the Mode drop-down box,
3. Type the new line in the Line: box and select or press Enter.

Figure E15 shows the display after entering “DD NNNN EEEE WWWW” as a new line in the middle of the “2468” category. Note that this line was entered manually, not as a new category placeholder line.

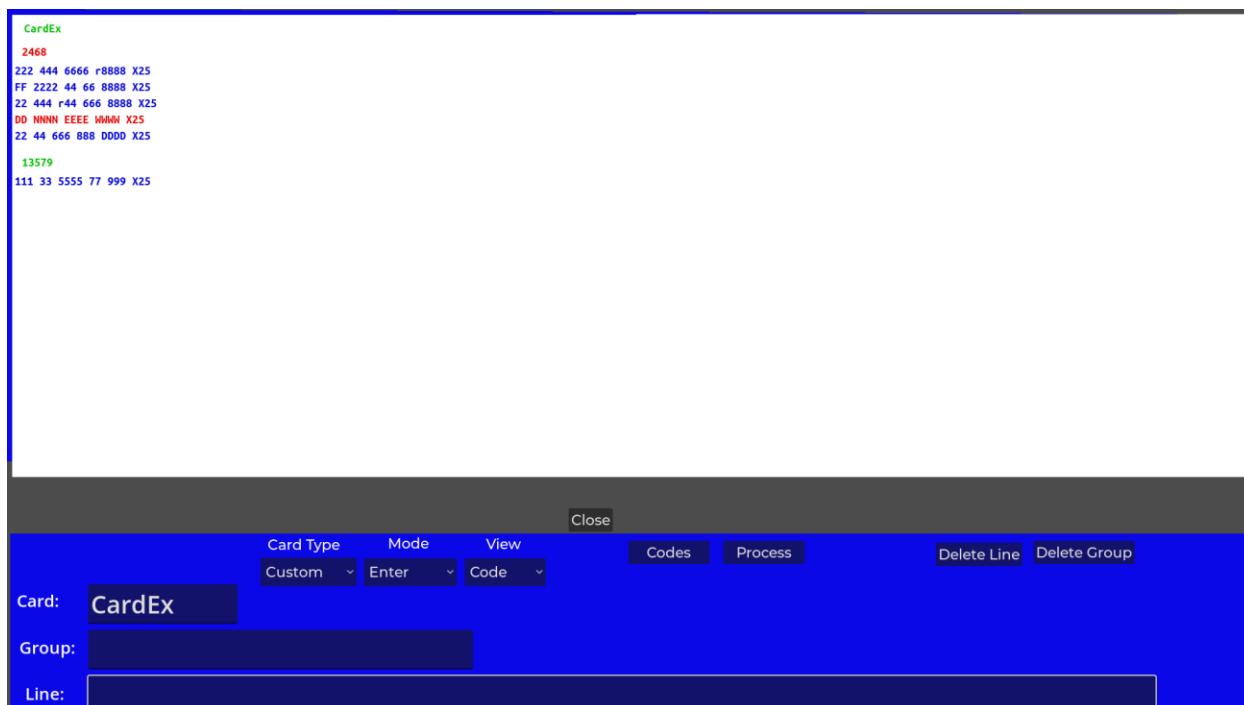


Figure E15. *Display after Inserting a New Line.*

If done with this card, press the “Process” button. The “Process” button converts the card code into a form that the app can load quickly and generates statistics about the card. When processing is complete and a line is selected, the number of unique hands defined by the card, the selected category, and the selected line are shown as in Figure E16. In this simple example, there are a total of 24 unique hands defined by the card, 21 by the 2468 category, and 6 by the selected “22 444 r44 666 8888 X25” line. This selected line corresponds to 6 unique hands because there are sets which must have 2 different suits out of the 3 possible suits (bams, craks, or dots). The 6 possibilities are: 1) bam, crak, 2) crak, bam, 3) bam, dot, 4) dot, bam, 5) dot, crack, 6) crack, dot. Note that swapping the suits (bam, crak vs crak, bam for example) is not the same hand because the 1st suit tiles, 22 444, are not the same as the second suit tiles, 44 666 8888. If the tiles for the 2 suits were the same, this would be considered only 3 unique hands.

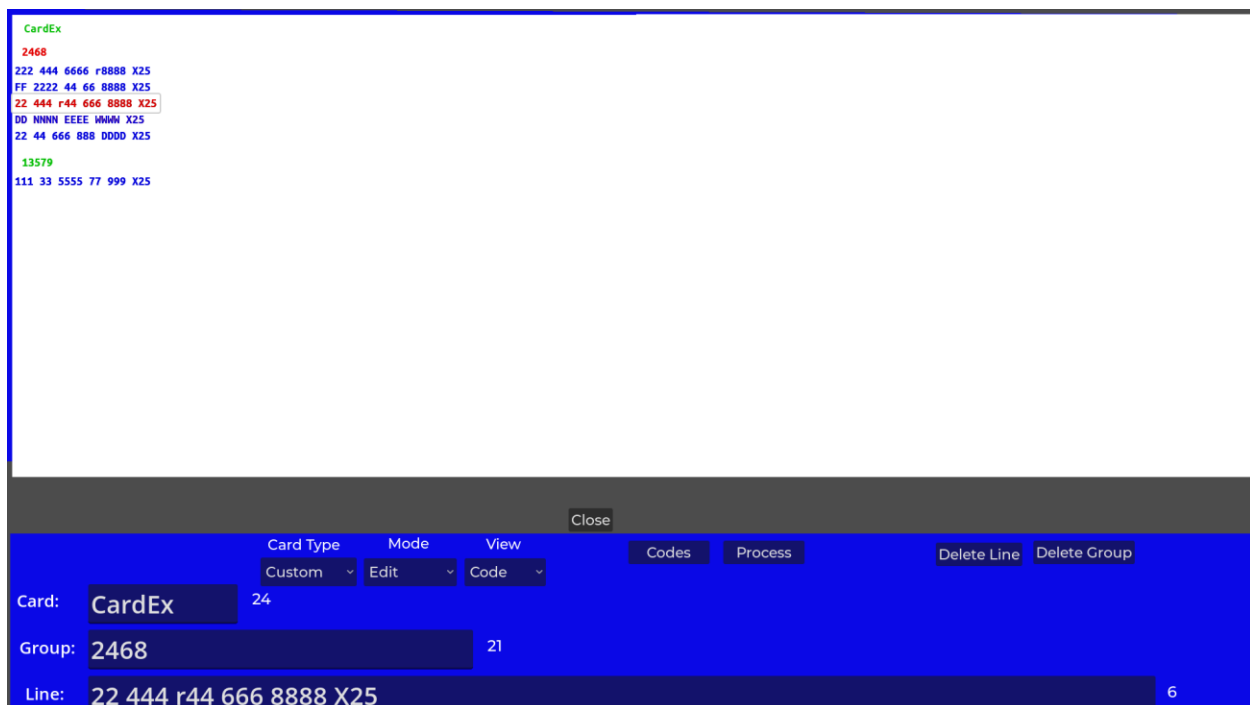


Figure E16. *Display After Selecting Process – Shows the Number of Unique Hands.*

The Codes button pops up the expander codes you can use in the line definitions. The Codes Summary popup is shown in Figure E17. The popup also lists a few other codes (“OR” code, dragon codes, and suit codes) at the bottom.

T = These No. Only
 V = Consecutive Nos.
 L = Like Nos. (any set sizes)
 I = Like Singles
 A = Like Pairs
 P = Like Pungs (3)
 K = Like Kongs (4)
 Q = Like Quints
 U = Unlike Nos.
 a,* = Any Suit
 R = Replace Set
 Y = Replace End Pairs
 H = Replace Cons. Pairs
 | = Alternate Pattern
 0 = White Dragon (Zero)
 R,G = Red, Green Dragon
 r,g,b = Red, Green, Blue Set

Figure E17. *Codes Summary Popup*

Deleting a Line, Group, or the Whole Card

To delete a line, select the line with the mouse (or by touching it on a touch screen). Click or press the “Delete Line” button to delete the line. If the line is the last line in a category, the category is also deleted.

To delete a category, select any line in the category you want to delete. This selects that category. Click or press the “Delete Group” button to delete the category. Deleting the last category will delete the card.

To delete a card, select the card by selecting the card name at the top of the editor display. Click or press the “Delete Card” button to delete the card. If you are using the browser version of the app, **NOTE:** clearing the cache will also delete all saved cards, in addition to your profiles.

Notes on making changes and correcting mistakes:

1. You can select a line in code view by mouse clicking or pressing on a particular line. This makes that line/category the current line and enters the “Edit” mode. The line and category selected will be shown in the Line and Group boxes. You can then edit either the line or the category. After making a change to the line or category, press enter in the line or category box. The editor will automatically return to enter mode and will enter new lines after the currently-selected line. To add new lines at the end, select the last line and change back to “Enter” mode using the mode dropdown. To enter a new category at the end, first select the last line, then change back to “Enter” mode and type a new category name in the Group: box.
2. You can delete a category or line by selecting a category/line and then pressing or selecting the “Delete Group” or “Delete Line” button. Deleting the last line of a category deletes the category.
3. You can also get back to “Enter” mode by selecting the line where you want to enter (after), then entering that line without any changes.
4. To select a line in Card view, you must select the first set on the left.
5. To select the whole card, click on or press the card name at the top. A “Delete Card” button is then shown. Pressing it will delete the card with no warning.
6. New lines added in edit mode are inserted after the selected line in a category. To insert a line before the first line in a category, you need to insert it after the first line, delete the first line, then re-enter the line you deleted after the new line.
7. New categories are inserted before the currently selected category unless the last line of the last category is selected (end of card), then the category is inserted after the last category.
8. Groups are selected by selecting any line in the category. If a new category is inserted before other categories, a placeholder line with the tiles “FF NNNN

EEEE WWWW” is inserted. This is to ensure that the category can be selected. You can’t select on the category name to select it – you must select one of the category’s lines.

9. You can change the line and category text to be entered in the Line and Group boxes until you enter it (select or press Enter).
10. Any changes you make are automatically saved.
11. The editor checks the number of tiles in each hand every time you enter a new line. If you enter a hand that does not have exactly 14 tiles, an error is output on the display indicating the wrong number of tiles (not 14). The hand is not entered until the line is corrected to have 14 tiles. No other error checking is performed. Figure E18 shows an example error after trying to enter only 13 tiles.

The screenshot shows a software interface with a blue header bar. In the top left corner, the year '2024' is displayed in green, and below it, '2024' is displayed in red. To the right of the year, the text 'FF NNN EEE MMM X25' is visible. In the top right corner, there is a small icon of a blue arrow pointing down. Below the header bar, there is a dark grey bar with a 'Close' button. Below this, there is a blue bar with a 'Card Type' dropdown menu set to 'Standard', a 'Mode' dropdown menu set to 'Enter', and a 'View' dropdown menu set to 'Code'. To the right of these dropdowns are two buttons: 'Codes' and 'Process'. Below the blue bar, there are three input fields: 'Card:' with the value '2024', 'Group:' with an empty field, and 'Line:' with the value '222 000 r2222 444'. To the right of the 'Group:' and 'Line:' fields, there is a red error message that reads 'ERROR: Wrong number of tiles 13'.

Figure E18. *Example of Attempting to Enter a Line with Only 13 Tiles.*

Viewing and Printing a Card

A custom or standard card entered with the card editor can be viewed during a game by selecting the “View Card” option from the game menu. Any cards included with JLMahJongg can also be viewed. An example of the Basic1 card viewed during a game is shown in Figure E19.



Figure E19. Example of Basic1 Card Viewed During a Game.

To print a card:

- 1) Perform a print screen operation with the card displayed as in Figure E19. In Windows you can press Fn + Print Screen (keys in blue) and choose “Rectangle” from the dropdown at the top. Select the card area on the screen that you want to print (dragging a rectangle). Note: I must do the print screen 2 times in a row to get the screen to copy to the clipboard.
- 2) Paste (cntrl V in Windows) the copied card into an app, such as Word, that can print.
- 3) Print the file

An example of a card copied in this way is shown in Figure E20.

Figure E20. *Example of Basic1 Card Copied and Ready to Print.*

Appendix F. Custom Tile Design

If you would like to design your own custom tiles and add them to JLMahJongg, please contact us and we will help you. Due to the potential use of inappropriate or copyrighted images without permission in our JLMahJongg app, we must restrict and approve use of custom tile images.

Appendix G. Mah Jongg Tile History

Mah Jongg (麻將, *ma jiang*) Tile History. Ma jiang means sparrow in Chinese. All Mah Jongg suits originally represented forms of Chinese currency. What are now called bam's or bamboo, were originally bags of sparrows. People were encouraged to catch sparrows and then used them as a form of currency. Eventually the sparrow bags became bamboo sticks. That is also why the 1 bam tile traditionally has a bird on it.

The dots suit's round shape represents a 筒 (*tóng*), a coin with a square hole in the middle. The dots suit is also referred to as stones, wheels, circles, or cookies.

The crak, or character suit is also known as numbers or thousands. These tiles have the character for one to nine and the character 萬 (*wàn*) below, which means 10,000.

The eight flower tiles include four tiles representing the four seasons: winter (冬天, *dōngtiān*), spring (春天, *chūntiān*), summer (夏天, *xiàtiān*), and fall (秋天, *qiūtiān*). The remaining flower tiles represent the four Confucian plants: bamboo (竹, *zhú*), chrysanthemum (菊花, *júhuā*), orchid (蘭花, *lánhuā*), and plum (梅, *méi*).

It is common to see the Flower tiles in sets of four, as four plants or flowers, and as the seasons of the year. Depending on the Mahjong set, the flowers are commonly the Bamboo, Chrysanthemum, Orchid (or Iris), and the Plum Blossom. These four flowers/plants represent the Four Confucian Gentlemen/women.

Wind is one of two honor suits. These tiles each show a character for a compass direction: north (北, *běi*), east (東, *dōng*), south (南, *nán*), and west (西, *xī*).

The other honor suit is called arrows or dragons. The dragon meanings are derived from the ancient imperial exam, archery, and Confucius' cardinal virtues. The red dragon (*zhōng*), symbolizes the middle or animal order (including humans), the green dragon (*fā*), symbolizes the lower or plant order of life, the white dragon (*bai pan* – white tile), symbolizes the higher or spiritual order of beings.

A red dragon tile can feature a red 中 (*zhōng*, center). This Chinese character represents 紅中 (*hóng zhōng*), which connotes passing the imperial exam, a hit in archery, and the Confucian virtue of benevolence.

The green dragon can feature a green 發 (fā, wealth). This character is a part of the saying, 發財 (fā cái). This saying translates to "get rich," but it also represents an archer releasing his or her draw and the Confucian virtue of sincerity.

The last arrow or dragon tile (white dragon) can feature a blue 白 (bái, white), which represents 白板 (bái ban, white board). The white board means freedom from corruption, a miss in archery, or the Confucian virtue of filial piety, which advocates a set of moral norms, values, and a practice of respect and caring for one's parents.

And what's up with that classic joker tile? The joker tile is a relatively recent addition to Mah Jongg tile sets and is not always used or included. The current standard joker tile has been redrawn so many times, it is difficult to see what it represents. The original joker design was a dragon in a circle:



old (left) vs new (right) classic joker design

Our custom digital “Pro” tile set included with JLMahJongg brings back the dragon in a circle. The new dragon is guarding a rare blue diamond. The blue diamond is featured because the joker tiles are so valuable in American Mah Jongg.



(JLMahJongg “Pro” joker)

Appendix H. JLMahJongg Game Releases

First Beta test version 1.0 - Initial version released for limited use – No defense or multiple real player support

Minor release 1.1 - Initial defense display added for real player, bug fixes (not recognizing Mah Jongg if Help level is “None”)

Major Version 2.0 – Added defensive logic and help. Computer player at Pro level plays defense. Other minor and one major bug fix. *6 Nov 2022*

Version 2.1 to 2.3 – Minor bug fixes and added exposed tile highlighting for primary player. *12 Nov 2022*

Version 2.4 – Additional minor bug fixes and added: 1) Independent computer defense level option, 2) Ability to sort and select tiles any time (not just during your turn). *30 Dec 2022*

Version 3.0 – First version supporting multiple real players over the internet. *30 Dec 2022*

Version 3.1 – Updated to enable more flexibility in changing parameters and chatting during the game. *30 Dec 2022*

Version 3.2 to 3.4 – Bug fixes in multiplayer and new table layouts. Custom pro tile set added as an option. *28 Feb 2023*

Version 3.5 to 3.7 – Bug fixes and updates to align with version 4.0. *5 June 2023*

Version 4.x to 5.x – Added HTTP external interface. New Godot game engine upgrade from 3.7 to 4.0.

Version 6.X – Added SSH external server interface for non-iPad devices.

Version 7.X – Added SSH external interface to include iPads. Bug fixes. *6 November 2023*

Version 8.X to 9.4 – Bug fixes & upgrade to Godot 4.2.1. *1 December 2023*. Version 9.3 uses custom SSH and SFTP modules in the Godot game engine.

Version 9.5 – Bug fixes & upgrade to Godot 4.2.2. Added FTP interface. *6 May 2024*

Version 9.6 – Addition of the Card Editor and upgrade to Godot 4.3. Also synced with the Godot 3.5.3 long-term-stable version. *14 August 2024.*

Version 9.9.1 to 10.0.7 – Updates suggested by “Mah Jongg, That’s It” Facebook category. Streamlined user interface, can call players dead, alternate card colors for colorblind support, can add custom tiles, bug fixes. *25 August 2025.*

Version 10.1.0 – Updated to Godot Engine 4.6, fixed >2 real players, more network simplification, misc bug fixes, labeled red and green dragon tiles, warns beginner skill level if can’t call a tile, added fix for play in different time zones, added ability for users to change location. *30 Jan 2026.*

Version 10.1.10 – Bug-fix release: fixed a crash that could occur when an opponent discarded a joker; corrected a mismatch between the spoken and the displayed discard tile; kept the Start button from flashing during voice transfers; changed the voice menu to show player profile names instead of account names; fixed the in-game card name label after changing cards during a session; and players with no possible hand now show a “No viable hand” message at the end of a wall game. *1 July 2026.*

Version 10.1.13 – Networking and multiplayer reliability release: real players on different home networks can now connect directly to each other (cross-network) without needing the relay server; the network mode is now automatic, using a direct connection when possible and automatically falling back to the relay; local-network (LAN) games join much faster; and multiplayer play is more stable, so an occasional relay hiccup no longer crashes the game. Added a “one tile away” notification (when help is turned on) that lets you know when you need just one more tile for Mah Jongg. Also improved the accuracy of Best Hands and odds for hands that use flowers. *3 August 2026.*

Version 10.2.3 – Disqualification, multiplayer correctness and network simplification release: a game no longer freezes after a player is disqualified, and a disqualified player is now told the reason instead of being left to guess. The exposure that caused it is highlighted, their final hand shows the tiles they actually held, and their end-of-game caption reads “Last target:” rather than offering odds and match counts for a hand they can no longer make. A disqualified player can no longer call a discard or take a joker from another player. Several multiplayer display faults were corrected in which an exposed set could show the wrong tile, repeat a set, or show a tile the player never exposed. The network setup was simplified: the obsolete FTP option and the server voice library were removed, the automatic network mode keeps its setting between sessions and is now labeled “Auto”, and a player running an incompatible older build is told so instead of silently failing to connect. *13 August 2026.*

Version 10.2.10 – Card editor, account and profile name release: the card editor no longer crashes while a hand is being entered, a missing card file is rebuilt instead of failing, and a card is saved under the name you typed rather than the name of a bundled card. The editor no longer copies a bundled card into your own card file, and cards that are not permitted are no longer selectable. A card mismatch is now reported in the lobby, and a player joining a game keeps their own stored card. Account handling was corrected in several ways: logging in to a different account no longer renames it, renaming an account and logging out now reach the server, and your playing status is no longer published under another player's account, which could leave the wrong profile name showing against an account. On guest accounts the profile name set on your own device is now the one used. In “no internet” mode the app keeps your real account instead of writing under the first account in the list. Administrative controls are now tied to the account signed in rather than to a position in the player list. Status updates no longer stop after the network drops and returns. The main menu was simplified, players are no longer incorrectly shown as being on your local network, and the web version no longer offers network options it cannot use. *13 September 2026.*

Version 10.2.11 – Engine update release: updated to Godot Engine 4.7.2 on every platform, and the Windows program now shows its correct version number in its file properties. *27 September 2026.*

Version 10.2.12 – Game rules, sound and multiplayer lobby release: a false Mah Jongg declaration now always disqualifies the player. Previously, in a single-player game, a false Mah Jongg declared after your own draw could be cancelled instead: the drawn tile went back to the discards and the turn passed on. The disqualification sound now plays only once per player. If your profile's Sound option is off, choosing “UnMute” during a game now turns on voice and sound effects for that game. In Relay mode, the host's lobby status now reads “Waiting For Players” instead of “Checking For Hosts”, and a player who stops hosting now sees newly hosted games without pressing “Find Hosts”. Logging in is more reliable after a network outage. If the server's player list changes while the app is running, you are asked to restart rather than being shown the wrong accounts. The Windows program is also about 2 MB smaller. *8 October 2026.*

Current Limitations & Bugs:

A player quitting before or in the middle of a game may break the game for the remaining players.

If your IP address changes, you may need to restart the app.

Joining as a guest may not always work and might hang the game.

Changing Table types during a game may cause the previous game's shown tiles and discards to be shown in the next game.

The "AutoDone" setting might change by itself during a game if you go back to settings and then return.

Have not tested lately with more than 3 real players or any guests.

If you change network type or card type, you may have to exit the app and restart for the change to take effect.

Appendix I. Encryption and License Information

Encryption

JLMahJongg only uses publicly available encryption algorithms for connecting over standard interfaces (HTTPS). No proprietary or non-standard encryption code or algorithms are used.

License Information

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Appendix J. Privacy Policy

Our privacy policy was last updated on 13 September 2026.

This describes Our policies and procedures on the collection, use, and disclosure of Your information when You use our website/game and tells You about Your privacy rights and how the law protects You. We use Your Personal data to provide the Mahjongg game and to enable multiple players to play across the internet. By using the website and game, You agree to the collection and use of information in accordance with this Privacy Policy.

The following definitions shall have the same meaning regardless of whether they appear in singular or in plural. Definitions for the purposes of this Privacy and Security Policy:

- "Company" (referred to as either "the Company", "We", "Us" or "Our" in this Agreement) refers to Seaside Dream LLC; John and Lisa Smigel
- "You" means the individual accessing or using the Service, or the company, or other legal entity on behalf of which such individual is accessing or using the Service, as applicable.
- "Account" means a unique account created for You to access our game.
- "Device" means any device that can access the Service such as a computer, a cell phone, or a digital tablet.
- "Personal Data" is any information that relates to an identified or identifiable individual. For the purposes of General Data Protection Regulation (GDPR), Personal Data means any information relating to You such as a name, an identification number, location data, online identifier or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural, or social identity. For the purposes of the California Consumer Privacy Act (CCPA), Personal Data means any information that identifies, relates to, describes or is capable of being associated with, or could reasonably be linked, directly or indirectly, with You.
- "Service" refers to the Website and JLMahJongg game
- "Website" refers to JLMahJongg.com

Personally identifiable information may include, but is not limited to:

- Email address
- First name, last name, and profile name
- State, Province, ZIP/Postal code, City
- Usage Data. Usage Data is collected automatically when using the Service. Usage Data may include information such as Your Device's Internet Protocol address (e.g. IP address), browser type, browser version, the pages of our Service that You visit, the time and date of Your visit, and unique device identifiers. When You access the Service by or through a mobile device, we may collect certain information automatically, including, but not limited to, the type of mobile device You use, Your mobile device unique ID, the

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Use of Your Personal Data. The Company may use Personal Data for the following purposes:

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- To manage Your Account: to manage Your registration as a user of the Service. The Personal Data You provide can give You access to different functionalities of the Service that are available to You as a registered user.
- To contact You: To contact You by email or other equivalent forms of electronic communication, regarding updates or informative communications related to the functionalities, products, or services, including the security updates, when necessary or reasonable for their implementation.
- To provide You with news and general information.

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- With Your consent: We may disclose Your personal information for any other purpose with Your consent.

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Where your data is sent

Visitor comments may be checked through an automated spam detection service.

You can contact us by sending us email at: seasidedreamllc@gmail.com.

Appendix K. End User License Agreement (EULA)

Introduction

This End User License Agreement (the "Agreement") is a binding agreement between you ("User" or "you") and the Seaside Dream LLC, the "Company." This Agreement governs your use of the JLMahJongg application (the "Application") for any supported operating systems (including all related documentation). The Company reserves the right to change or modify any of the terms and conditions contained in the Agreement without notice and all such revisions are effective immediately upon posting and apply to all access to and continued use of the Application.

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- (b) modify, translate, adapt or otherwise create derivative works or improvements, whether or not patentable, of the Application;
- (b) you may receive notice of or be prompted to download and install available Updates.

You shall promptly download and install all Updates and acknowledge and agree that the Application or portions thereof may not properly operate should you fail to do so. You further agree that all Updates will be deemed part of the Application and be subject to all terms and conditions of this Agreement.

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The term of Agreement commences when you download/install the Application and will continue in effect until terminated as provided herein (the "Term"). You may terminate this Agreement by deleting the Application and all copies thereof from your Device(s). Company may terminate this Agreement at any time without notice if it ceases to support the Application, which Company may do in its sole discretion. In addition, this Agreement will terminate immediately and automatically without any notice if you violate any of the terms and conditions of this Agreement. Upon termination, all rights granted to you under this Agreement will also terminate and you must cease all use of the Application and delete all copies of the Application from your Mobile Device and account. Termination will not limit any of Company's rights or remedies at law or in equity.

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TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW, IN NO EVENT WILL COMPANY OR ITS AFFILIATES, OR ANY OF ITS OR THEIR RESPECTIVE LICENSORS OR SERVICE PROVIDERS, BE LIABLE FOR PERSONAL INJURY OR ANY INCIDENTAL, SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES WHATSOEVER, INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF PROFITS, LOSS OF DATA, BUSINESS INTERRUPTION, OR ANY OTHER COMMERCIAL DAMAGES OR LOSSES, ARISING OUT OF OR RELATED TO YOUR USE OF OR INABILITY TO USE THE APPLICATION, HOWEVER CAUSED, REGARDLESS OF THE THEORY OF LIABILITY (CONTRACT, TORT, OR OTHERWISE) AND EVEN IF COMPANY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. SOME JURISDICTIONS DO NOT ALLOW THE LIMITATION OF LIABILITY FOR PERSONAL INJURY, OR OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THIS LIMITATION MAY NOT APPLY TO YOU. In no event shall Company's total liability to you for all damages (other than as may be required by applicable law in cases involving personal injury) exceed the amount of fifty dollars (\$50.00). The foregoing limitations will apply even if the above stated remedy fails of its essential purpose.

Indemnification

You agree to indemnify, defend and hold harmless Company and its officers, directors, employees, agents, affiliates, successors and assigns from and against any and all losses, damages, liabilities, deficiencies, claims, actions, judgments, settlements, interest,

awards, penalties, fines, costs, or expenses of whatever kind, including attorneys' fees, arising from or relating to your use or misuse of the Application or your breach of this Agreement. Furthermore, you agree that Company assumes no responsibility for the content you submit or make available through this Application.

Export Regulation

The Application may be subject to United States export control laws, including the US Export Administration Act and its associated regulations. You shall not, directly or indirectly, export, re-export or release the Application to, or make the Application accessible from, any jurisdiction or country to which export, re-export or release is prohibited by law, rule or regulation. You shall comply with all applicable federal laws, regulations and rules, and complete all required undertakings (including obtaining any necessary export license or other governmental approval), prior to exporting, re-exporting, releasing or otherwise making the Application available outside the United States.

Severability

If any provision of this Agreement is illegal or unenforceable under applicable law, the remainder of the provision will be amended to achieve as closely as possible the effect of the original term and all other provisions of this Agreement will continue in full force and effect.

Governing Law

If (a) you are not a U.S. citizen; (b) you do not reside in the U.S.; (c) you are not accessing the Application from the U.S.; and (d) you are a citizen of one of the countries identified below, you hereby agree that any dispute or claim arising from this Agreement shall be governed by the applicable law set forth below, without regard to any conflict of law provisions, and you hereby irrevocably submit to the non-exclusive jurisdiction of the courts located in the state, province or country identified below whose law governs.

If you are a citizen of any European Union country or Switzerland, Norway or Iceland, the governing law and forum shall be the laws and courts of your usual place of residence.

Entire Agreement

This Agreement constitutes the entire and only agreement between the parties in relation to its subject matter and replaces and extinguishes all prior or simultaneous

agreements, undertakings, arrangements, understandings or statements of any nature made by the parties or any of them whether oral or written (and, if written, whether or not in draft form) with respect to such subject matter. Each of the parties acknowledge that they are not relying on any statements, warranties or representations given or made by any of them in relation to the subject matter of this Agreement, save those expressly set out in this Agreement, and that they shall have no rights or remedies with respect to such subject matter otherwise than under this Agreement save to the extent that they arise out of the fraud or fraudulent misrepresentation of another party. No variation of this Agreement shall be effective unless it is in writing and signed by or on behalf of Company.

Waiver

No failure to exercise, and no delay in exercising, on the part of either party, any right or any power hereunder shall operate as a waiver thereof, nor shall any single or partial exercise of any right or power hereunder preclude further exercise of that or any other right hereunder.

Contact Information

For general inquiries, complaints, questions, or claims concerning the Application, please contact:

Seaside Dream LLC (seasidedreamllc@gmail.com)