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Technical Description of the Go*Team User Interface

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ABSTRACT

This report describes the technical capability of the Go*Team game software for experimenting with teaming arrangement in an NCW context. Go*Team is based on the ancient game of Go and the implementation is an instance of a simulation framework.

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Technical Description of the Go*Team User Interface

Executive Summary

There is a need for analysis of the human aspects of network warfare. Go*Team is a game that creates an opportunity for cooperation and coordination between teams and individuals. By creating a simple competitive and collaborative environment where players compete against each other as individuals and as teams, human factors may be identified which could have a profound impact on the outcomes of future Network Centric Warfare wars.

Go*Team is based on the traditional game of Go in which players place black and white stones onto a board in order to occupy territory on the board. Go*Team is designed to allow a number of competing teams to play Go with a number of players in each team. Every player on a team has a local view of the game. Players on the same team must collaborate if they want to have a more complete picture of the actual game state.

Go*Team game has been designed as a research vehicle for investigating collaboration and cooperation between team members in a competitive and dynamic environment. The Go*Team has been extensively used to conduct simulation experiments in teaming environment by both DSTO and University of Wollongong.

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1. Introduction

The focus of Network Centric Warfare (NCW) efforts has largely been concentrated on issues related to technology and infrastructure. However, there is a growing trend in the scientific community to analyse the human aspect of network warfare. The human factors community has concerns about the impact of technology on human performance, and has identified a need for investigation of individual and group behaviours in an NCW context.

There are many possible ways of testing hypotheses regarding human and organisational behaviour. A practical approach is to conduct a real-life experiment. Sometimes it is impossible to set this up due to technical and economical constraints. It can also be difficult to establish validity of conclusions based on a limited experimental sample. An alternative is to abstract some of the key attributes of a real-life system into a model, allowing for unlimited repetition and an understanding of the behaviour of the real-life system. The computerised Go*Team game is an example of such an approach. Go itself has nothing to do with NCW *per se*, but it creates an opportunity for cooperation and coordination between teams and individuals. By creating a competitive and collaborative environment where players and teams compete against each other, human factors may be identified which could have a profound impact on the outcomes of future NCW wars. The Go*Team requirements have been specified by Dennis Hart, a member of the HD research team (Task CDE 07/031).

2. History of the Go Game

Go is probably the first board game. Though it is thousands of years old, the rules remain mostly unchanged. Go originated in central Asia where it is still very popular today. Over the last few hundred years the Go game has spread all around the world. Go has increased in popularity to the point where there are now professional Go players, sponsored major tournaments, and international Go championships.

2.1 Rules of the Game

2.1.1 Idea of the game

A Go game consists of black and white stones and a square board with grid lines. The board sizes can vary, though a standard board has 19x19 grid lines. A Go game comprises two players who take turns placing stones onto the grid line intersections of the board. The goal of the game is to occupy the most territory on the board. Players place stones onto the board staking claim to areas which they intend to occupy. As the game progresses, players have to defend their positions while attempting to gain more territory. Stones cannot be moved once they are placed onto the board, however, they can be captured resulting in their removal from the board. Stones are captured when they are surrounded by an opponent's stones. While capturing stones is not the object of the game it does provide a useful way of gaining additional territory. The winner of the game is the player who controls a larger proportion of the board when the game ends.

2.1.2 Capturing Stones

A basic rule that should be understood in order to play Go is the capture. In order to explain capture, we must first introduce the concept of liberties. Liberties are the positions horizontally and vertically adjacent to a stone. A stone is captured when enemy stones occupy all of its liberties.

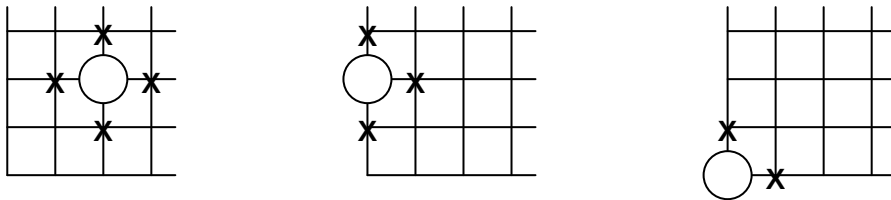


Figure 1. A stone's liberties

Stones which have no other adjacent stones and are not on the edges of the board have 4 liberties as indicated by the Xs. Stones on the edge only have 3 liberties. And stones in the corners only have 2 liberties.

Groups of stones can also be captured. Player stones that are in adjacent positions on the board are connected and form a group. A group is captured when enemy stones occupy all of the group's liberties.

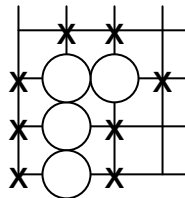


Figure 2. The liberties of a group of connected stones

2.1.3 Ko

There is a possibility of infinite repetition called Ko (meaning eternity in Japanese). The Ko rule prevents players from making moves which result in reverting the board to a previous state.

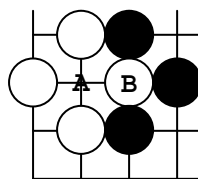


Figure 3. Typical Ko situation

Typical Ko situation. If black places a stone at A, this will result in the capture of the white stone at B. At this stage white is not allowed to place another white stone at position B because this would recreate the previous board state. However, if white places a stone somewhere else on the board, then on their next move they will be allowed to place a stone at B as the board state will no longer be exactly the same.

2.1.4 Suicide

It is illegal to place a stone on a point that would result in its capture. This is known as suicide and is not allowed. However it is allowed to place a stone into a position that looks like suicide if it results in the capture of opponent stones.

2.1.5 Scoring

The score at the end of the game can be calculated by area or by territory. The purpose of scoring is to determine which player controls a larger proportion of the board.

Territory is the empty points on the board which are surrounded by stones of a particular colour. The surrounded territory belongs to the owner of that colour.

Area includes the territory and the points occupied by 'live' stones. Stones are live if their capture is not considered to be inevitable.

When counting score by territory, the captured stones (or prisoners) are added to the score. When counting by area, the captured stones are not included in the score. The scores will differ for the different scoring systems, but the winner will always be the same regardless of which scoring method is chosen.

3. Go*Team Requirements

Go*Team is a modified version of the ancient Go game adapted with the purpose of simulating an NCW environment. The technical architecture of Go*Team is documented in [1, 2].

The Go*Team allows more than one person to play for a particular stone colour, and the stone colours are not limited to just black and white. People playing for the same colour are on the same team and they cooperate with each other to achieve victory for their team. Teams can form alliances to simulate coalition forces. A game can be played by many teams on many boards with a limited number of allocated stones. In order to introduce the "fog of war" each player can see only the partial state of the game (Fig 5, 6) while only the game host can enjoy the full view of the game (Figure 4).

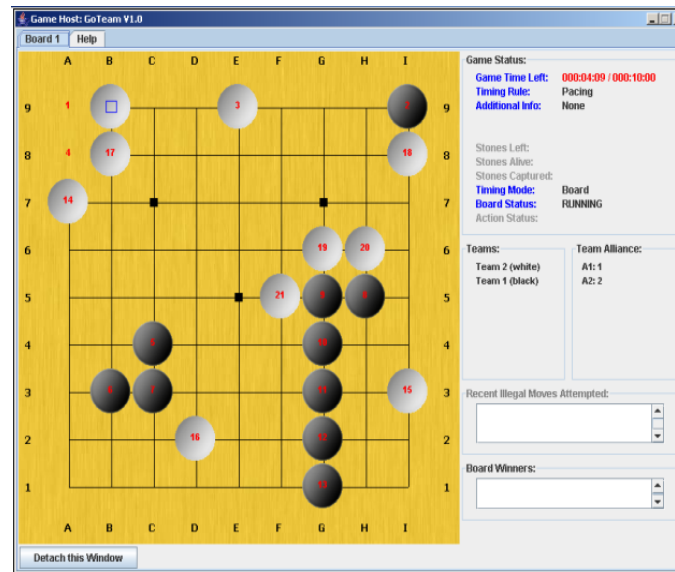


Figure 4. The global Go*Team Situation Awareness
(full view of the game)

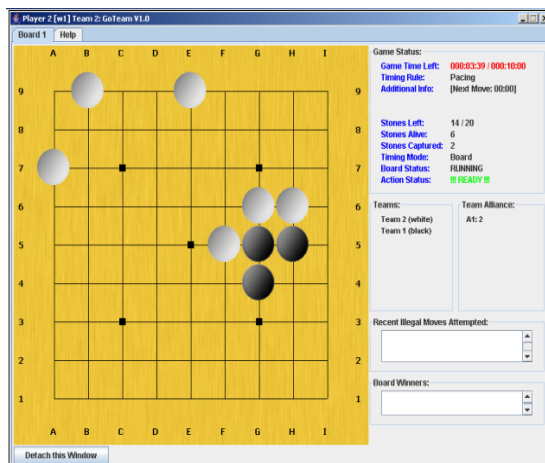


Figure 5. The partial view of one of the
two black players, who can see only their
own stones plus those stones of white that
are closer to their own stones than those of
any other player on the black team

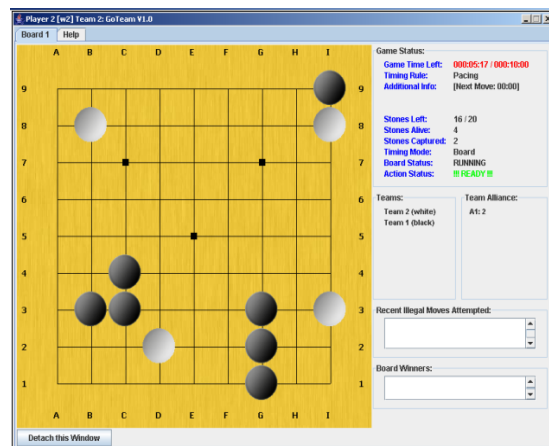


Figure 6. The partial view of one of the
other black players

The individuals from one team only have a local view of the game. They cannot see where the stones of other players on their team are, and they cannot see opposition team stones that are not close to their own stones. However it is possible for a team to “reconstruct” a complete picture of the game state if everyone on the team shares their knowledge.

3.1 Go*Team Play

Each player joins a Go*Team game through their own Go*Team client. When a player joins a game they must select which team they will be playing for. Teams can form alliances to simulate coalition forces. A game can be played by many teams on many boards with a limited number of allocated stones. Team members can communicate with each other utilising any form of communication (e-mail, chat, telephone, video, etc) in order to decide the next placement of a stone on a selected board to maximise the impact. Interactions between team members should be recorded for analysis later. The team that occupies the most territory on the board is the winning team, and the player from the winning team who has the greatest number of stones alive on the board is the winning player on that board.

4. Go*Team Software

The technical architecture for Go*Team has been published in a series of MILCIS papers [1, 2]. Fundamentally the Go*Team game consists with two software components:

- Server
- Client

The server component creates a game for clients to join into. The configuration of the game on the server determines how many clients can join into a game.

The client component provides an interface for access to the game server and allows for participation in the game. The server software should be up and running before the client software can be activated. An error will occur if a client tries to connect to a non-existing server or if the name of the host that runs that game server is wrongly specified.

4.1 Go*Team Server

When the server is first started either a new game must be created, or an existing game should be loaded. Creating a new game involves specifying the scope of the game.

The game configuration parameters required to start a new game are:

- game duration
- number of teams
- number of players on each team
- number of boards
- board sizes
- which teams are playing on which boards
- what alliances exist between teams

This section documents how to use the server user interface to setup and conduct Go*team games. The user interface features that will be described include:

- File Menu
 - o Configuration a New Game

- o Board Sizes
- o Changing Game Settings
- o Server Game Board

4.1.1 File Menu

The server software is loaded by executing the following command line inside the Go*Team directory,

```
.\jre1.5.0_01\bin\java -classpath build/classes;dist/GoTeam.jar;lib/third-party/bsh-2.0b2.jar;lib/third-party/xpp3-1.1.3.4.C.jar;lib/third-party/xercesImpl.jar;lib/third-party/xml-apis.jar
dsto.simulation.framework.SimServer 250 250 go.xml
```

Alternatively the Go*Team Server.bat batch file can be executed.

When the Host is first started the Host Window appears with just a File menu in the menu bar. The File menu has the following menu items:

New Game – start and configure a new game

Restart Game – restart the current configured game

Load – restore an existing game state and configuration from file

Save – save the current game state and configuration to file

The Save and Restart menu items can be used at any time after the initial game configuration has been setup, or after a game has been loaded from file.

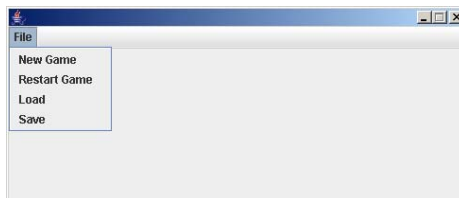


Figure 8. The File menu of Go*Team server

Case 1

After selecting the New Game menu item from the File menu, the Game Setup window will appear. (see below for configuring a new game flow)

Case 2

After selecting the Load menu item from the File menu, a File Chooser dialog will appear from which a saved game file can be loaded.

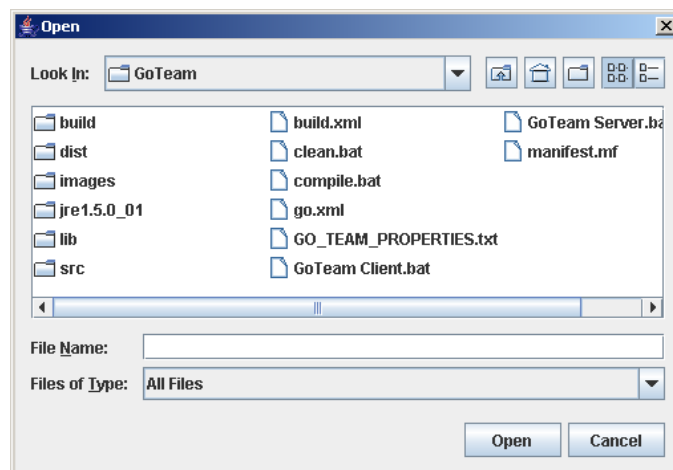


Figure 9. Loading a saved game

4.1.1.1 Configuring a New Game

The first part of configuring a new game is the game setup. The Game Setup window allows for configuration of

- the number of boards
- game duration
- the number of teams
- what alliances exist between teams

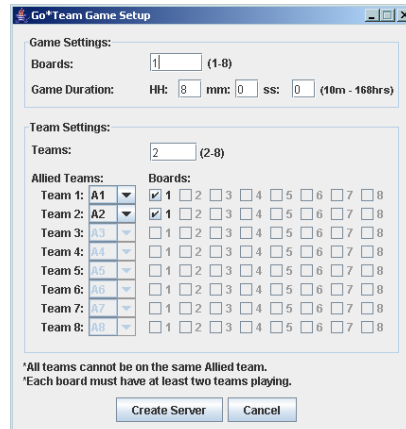


Figure 10. Game setup for configuring a new game

4.1.1.1.1 Game Settings

Boards: the number of boards in the game. [default 1 board]

Game Duration: How long the game should run for. [default 8 hours] HH is hours, mm is minutes, ss is seconds. The minimum game duration is 10 minutes, maximum is 168 hours.

4.1.1.1.2 Team Settings

Teams: the number of teams involved in this game. [default 2 teams]

Allied Teams: Teams can join an alliance group. [default each team has its own alliance group of which it is the only member]. Any teams which belong to the same alliance group are allies. *eg. Team 1 and Team 2 belong to alliance group A1, so they are allies. Team 3 belongs to alliance group A2 which doesn't have any other teams.*

4.1.1.1.3 Boards

The numbered checkboxes indicate which boards the teams will be playing on. [default all teams are playing on all boards] by unselecting boxes it is possible to setup so that different boards have different teams playing on them. *eg. Team 1 and Team 3 are playing on Board 3. All teams are playing on board 2. Team 2 and Team 3 are playing on board 3.*

Create Server – create a new game with the specified configuration

Cancel – closes the game setup window and returns to the initial Go*Team server window.

4.1.1.2 Board Sizes

When the Game Server is created for the specified configuration, a number of board size dialogs appear. A board size dialog will appear for each board in the game.

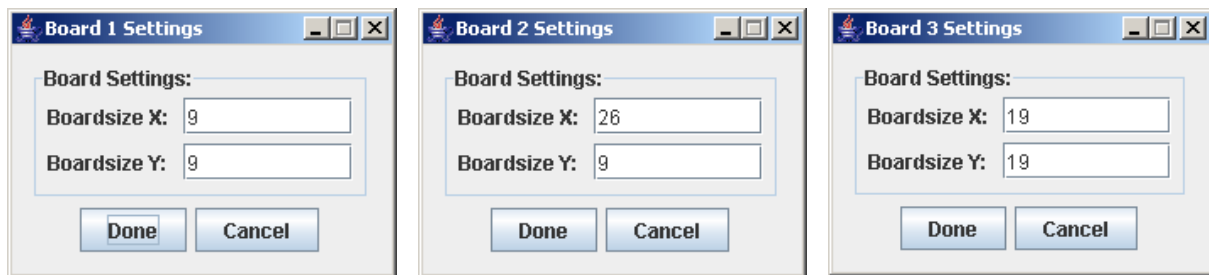


Figure 11. Setting the board sizes

Default size is 19 by 19. Board dimensions can be anything from the minimum 9 to the maximum 26. *eg. Board 1 is configured to 9x9, Board 2 is 26x9, Board 3 is 19x19.*

4.1.1.2.1 Stone Allocation

When the teams have been allotted to play on certain boards, and the board sizes have all been specified, a number of stone allocation dialogs will appear. There is a separate Stone Allocation dialog for each team involved in the game.

Each team will have a limited number of stones to allocate to the players in the team. The total number of stones available to allocate is dependent on how many boards the team is playing on, how many other teams are playing on those boards, and the sizes of those boards.

The number of players on the team must first be specified, then stones can be allocated to each player on the team.

Team 1: Stone Allocation

Team 1 (black)

General Settings:

Players: 3 Stones Remaining: 0

Stone Allocation:

Player 1:	40	Player 2:	40
Player 3:	40	Player 4:	
Player 5:		Player 6:	
Player 7:		Player 8:	
Player 9:		Player 10:	

Okay Default Cancel

Figure 12. Allocation of stones to players on team 1

4.1.1.2.1.1 General Settings

Players: the number of players on this team [default 1 player]. Maximum 10 players per team.
eg. Team 1 (black) has 3 players

Stones Remaining: the number of stones left to allocate to players on this team.

4.1.1.2.1.2 Stone Allocation

Player 1 to 10: for each player a number of stones should be allocated. eg Player 1 has been allocated 40 stones, Player 2 has 40 stones and Player 3 has 40 stones

Okay – click when number of players for team is specified and all stones have been allocated

Default – Assigns only one player with all the stones

Cancel – cancels this stone allocation window and returns to the previous setup window

When the number of players and stone allocations have been completed for all the teams, the initial stage of game configuration is complete. The basic game settings specified up to this stage cannot be changed during game play. The number of boards, number of teams, number of players per team and player stone allocations are all fixed. Alliances between teams can be changed during game play.

4.1.1.3 Changing Game Settings

Once the initial stage of game configuration is complete, or when an existing game configuration is loaded from file, the global settings window will be populated with a number of tabbed panes and a game host window will appear. There are a number of important settings which can be changed during game play. These settings appear in the Global Settings window as a number of tabbed panes, labelled Time Settings and Game Settings. The Global Settings window also has some panels for monitoring the progress of the game.

4.1.1.3.1 Time Settings

The Time Settings panel contains everything necessary for controlling the game progress. The game can be started and stopped, boards can be suspended, and the turn scheduling schemes can be changed.

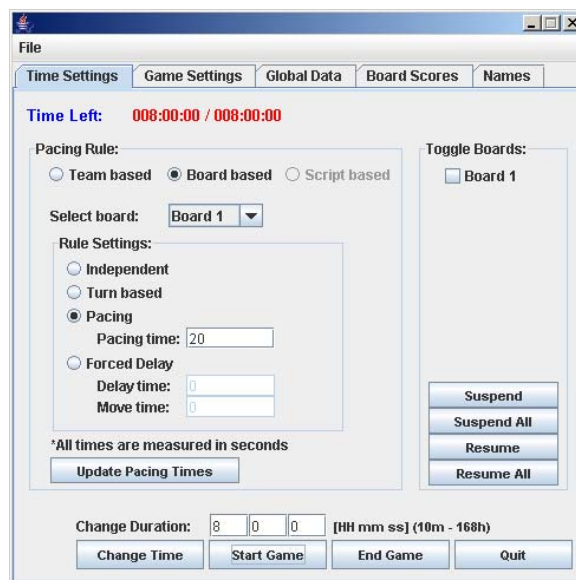


Figure 13. Time Settings pane

An important part of Go*Team is how the turns are scheduled. The Pacing Rule has a number of different turn scheduling options. Scheduling schemes can be specified on a team basis, or on a board basis. A pacing rule specified for a team means that the pacing timer applies across all boards for that team. If any player from a team uses up a turn on any board, then that team's turn is used across all boards. A pacing rule specified for a board means that the same turn scheduling scheme applies for all teams that are playing on the board. Board based timing and team based timing cannot be mixed.

Pacing Rule:

Team based – the specified pacing rule will apply to a certain team across all boards

Board based – the specified pacing rule will apply to a certain board

Script based – not implemented

All the different pacing rules are possible for board based timing. For team-based timing only the Pacing rule setting is applicable. Using a team based Pacing rule allows for setting up different pacing times for different teams even if they are playing on the same board. Teams with a shorter pacing time will have to make decisions faster, however this allows them to place more stones on the board giving them an advantage over teams with longer pacing times.

Select board/team: the board / team that this pacing rule applies to.

There are a number of different turn scheduling schemes that can be used to control the flow of the game. The turn scheduling schemes specify what teams have to wait for before taking a turn.

If teams should wait for other teams before taking a turn, then either the turn based or forced delay scheme should be used. Forced delay should be used to prevent teams from making hasty moves, while at the same time being able to specify how much time they have to make a move. The Turn based scheduling scheme allows teams to take as much time for a move as they wish.

If teams shouldn't have to wait for each other before taking a turn then either the independent or pacing scheme should be used. The Independent scheduling scheme allows any team to place stones at any time. In the Pacing scheme, after placing a stone, a team must wait for a specified relaxation period before being allowed to place another stone.

Rule Settings:

Independent – all players can place stones onto the board at any time

Turn based – teams must take turns placing stones onto the board

Pacing - teams must wait for a relaxation period before placing another stone

Pacing time: relaxation period [default 0 seconds] *eg. on Board 1 all teams must wait for 20 seconds before being able to place another stone onto the board for their team.*

Forced Delay – there is a period in which no team can make a move, and then a single team will have a period in which it has the opportunity to make a move.

Delay time: the period in which no team can make any move

Move time: the period in which a single team has the opportunity to make a move

Forced Delay results in a fixed game pace. Whether teams make their moves or not the turn scheduling progresses at a fixed rate. This means teams can know precisely when their next turn is going to come, which could be useful in some circumstances.

In both Turn based and Forced delay scheduling schemes, the ordering of team moves is based on a randomly ordered list.

Update Pacing Times – this button must be pressed for the Pacing rules to come into effect

Toggle Boards:

Game boards can be suspended or resumed during the game. A suspended board rejects all input from players, and all pacing timers for the board are paused. If all boards are suspended, then the game timer is stopped also. Boards which are not suspended appear in black, and suspended boards appear in red.

In some cases it may be useful to specify a game duration so that there is a fixed period of play. The game duration is a timer that counts down when the game is started. When the game duration is expired the game ends automatically and teams are no longer able to make moves. The board and player winners are reported to every client at the end of the game.

Change Duration: How long the game should run for. [default 8 hours] HH is hours, mm is minutes, ss is seconds. The maximum game duration is 168 hours, minimum is 10 minutes.

Change Time - the game duration is set to whatever is specified in the Change Duration field. The duration can be changed at any time during the game.

Start Game – starts the game initially. The start game button can also be used to continue a game that has been ended.

End Game – stops all game timers, prevents any further player input and reports board and player winners to game clients.

Quit – kills the game host entirely.

4.1.1.3.2 Game Settings

The game settings tab allows for changing of a number of settings during the game such as the alliances between teams, how captured prisoners are divided in an alliance setting, and what ancient Go rules apply in game play.

Alliances

Alliances allow for very intriguing game play in Go*Team. Alliance groups are visible to all players, it is not possible to form a secret alliance. However alliances can be changed part way through a game by arrangement with the game host. On the client board the stones from an allied team will appear the same as if they were an opponent team. i.e. the visibility rules do not change at all if teams are in an alliance. However, allied teams can work together to capture stones from teams that are not part of the alliance. When stones are captured by an alliance the prisoners must be allocated amongst the capturing teams in the alliance. There are a number of different methods for determining prisoner ownership amongst alliance groups, and it is possible to specify different methods for each game board.

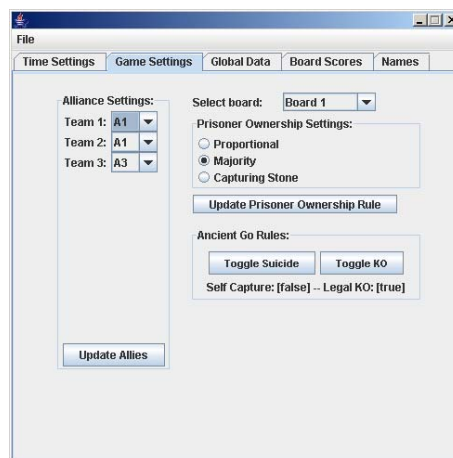


Figure 14. Game Settings pane

Alliance Settings:

Team 1 to 8: Teams can join an alliance group. [default each team has its own alliance group of which it is the only member]. Any teams which belong to the same alliance group are allies. *eg. Team 1 and Team 2 belong to alliance group A1, so they are allies. Team 3 belongs to alliance group A2 which doesn't have any other teams.*

Update Allies – this button must be pressed to update any changes in alliance settings. Alliances can be changed at any time during the game.

Select board: the board for which the prisoner ownership rules apply.

Prisoner Ownership Settings: the method for determining which team owns prisoners

Proportional – prisoners are distributed evenly amongst teams according to how many stones from that team were involved in the capture.

Majority – all prisoners go to the team that has the most stones involved in the capture.

Capturing Stone – all prisoners go to the team that placed the last capturing stone.

Update Prisoner Ownership Rule – this button must be pressed to update any changes in prisoner ownership rules.

Ancient Go Rules

There are some ancient Go rules which can be turned on or off using the toggle buttons.

In traditional Go, it is illegal to place a stone on a point that would result in its capture. This is known as suicide and is not allowed. Disallowing self capture is particularly useful for Go*Team because it prevents players from accidentally committing suicide. Because players do not have a complete picture of the game board they are quite likely to make moves which would not make any sense. If a player attempts a move that would result in self capture the game host rejects the move attempt as an illegal move.

Also in Go, there is a possibility of indefinite repetition called Ko. The Ko rule prevents players from making moves which result in reverting the board to a previous state. This rule is probably not so important in Go*Team as players will usually have an incomplete picture of state so it will be difficult to identify state repetition. However, it is possible to prevent state repetition at the game host by enforcing the Ko rule.

Toggle Suicide – is placement of a stone that results in self capture allowed [default Self Capture false] *eg. Self Capture false means that the game host will not allow placement of a stone that would result in immediate capture of that stone*

Toggle KO - is placement of a stone that results in a previous board state allowed [default Legal KO true] *eg. Legal KO true means that repetitive board states are allowed.*

4.1.1.3.3 Global Data

Global Data provides a useful overview of the team scores and individual player progress. It also shows the alliance groups for the teams and which boards the teams are playing on.

Team Boards/Allies:

Team	Boards Playing	Allied List
1 P(3)	1 2	1 2
2 P(1)	2 3	1 2
3 P(2)	1 2 3	3

Total Team Scores:

Team	Territories	Prisoners	Stones Left	Stones Alive
1	27	0	110/120	9
2	4	0	254/258	4
3	7	1	292/298	6

All Player Scores:

Team	Player	Name	Stones Left	Stones Alive
1	1	John	32/40	8
1	2	Helen	38/40	1
1	3	none	40/40	0
2	1	James	254/258	4
3	1	Alice	94/100	6
3	2	none	198/198	0

Figure 15. Global Data pane

Team Boards / Allies:

Team – the team number and the number of players P on that team

Boards Playing – the boards that this team is playing on

Allied List – the team numbers that this team is allied with

Total Team Scores:

Team – the team number

Territories – how much territory this team occupies

Prisoners – how many prisoners this team has captured

Stones Left – number of stones not yet used by this team / total stones allocated

Stones Alive – how many of the stones on the game boards belong to this team

All Player Scores:

Team – the team number

Player – the player number of a player on this team

Name – the name of the player

Stones Left – number of stones not yet used by this player / total stones allocated

Stones Alive - how many of the stones on the game boards belong to this player

4.1.1.3.4 Board Scores

Board scores provide a way of viewing the game progress for team and players on a board by board basis.

Board Scores:

Team	Territories	Prisoners	Stones Played	Stones Alive
1	25	0	8	7
3	5	1	4	4

Player Scores:

Team	Player	Name	Stones Played	Stones Alive
1	1	John	7	7
1	2	Helen	1	0
1	3	none	0	0
3	1	Alice	4	4
3	2	none	0	0

Size: 9 x 9

Figure 16. Board Scores pane

Board Scores:

Team – the team number

Territories – how much territory this team occupies on this board

Stones Played – number of stones this team has played on this board

Stones Alive – how many of the stones on this board belong to this team

Player Scores:

Team – the team number

Player – the player number of a player on this team

Name – the name of the player

Stones Left – number of stones not yet used by this player / total stones allocated

Stones Alive - how many of the stones on the game boards belong to this player

Size: the size of the board width x height eg. 9x9 is a board with width 9 gridlines, height 9 gridlines

4.1.1.3.5 Names

Names is a quick reference that can be used to find out which team and which player number a certain player is playing for.



Figure 17. Player Names pane

Player Names

Team – the team number

Player – the player number on this team

Name – the name of the player

e.g. Team 1 player 2 is Helen

Note – player name 'none' means that the player has not yet joined in to the game. *e.g. player 3 from team 1 and player 2 from team 2 have not yet joined the game.*

4.1.1.4 Server Game Board

The host has a complete view of all boards and all stones, including the order of placement of stones. The game host has a tabbed pane for each board in the game.

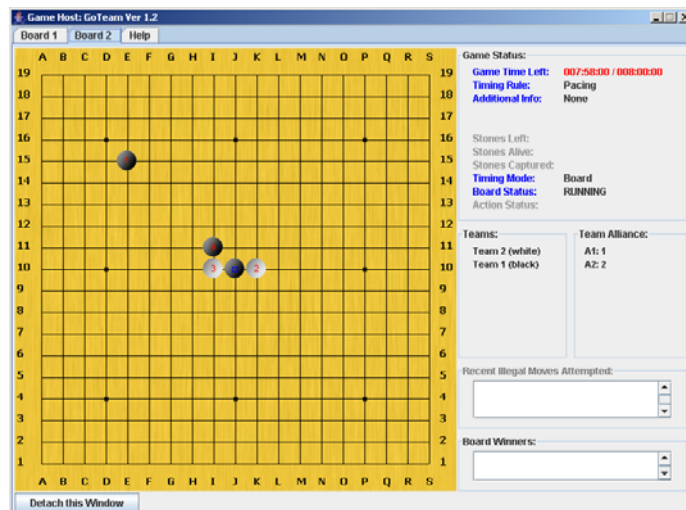


Figure 18. View of the game board on the game host

On the game host all stones placed by players appear on the game board. Each stone has a red number indicating when the stone was placed at that location. The most recent stone to be

placed on the board has a blue square. *e.g. black stone at J10 is the most recent stone. The host does not show which stones were placed by which players.*

4.1.1.4.1 Game Status

The game status panel contains the following information:

- **Game Time Left** in the format of x:x:x / y:y:y

where:

x:x:x - time left to play the game

y:y:y - duration of the game

- **Timing Rule & Additional Info** – displays one from the following list of timing rules:

Independent – all players can place stones onto the board at any time. The Additional Information label displays only the NONE word meaning there is no additional information for this timing rule.

Turn based – teams must take turns placing stones onto the board. The Additional Information label will display which team is currently taking a turn. This means that attempts to place a stone by players who are not from this team will be rejected.

Pacing - teams must wait for a relaxation period before placing their own stone. The Additional Information label will display how much time is left before a move is allowed.

Forced Delay – there is a period in which no team can make a move, and then a single team will have a period in which it has the opportunity to make a move.

- **Stones Left, Stones Alive and Stones Captured**

Greyed out on the server as these fields are applicable to clients only.

- **Timing Mode**

The timing mode displays one of the following

- Board* – the specified pacing rule applies to this board
- Team* – the specified pacing rule applies to this team

- **Board Status**

The board can be in one of the following states:

NOTSTARTED – game has not started

RUNNING – game is running

SUSPENDED – this board is temporarily suspended

FINISH – game has finished

- **Action Status**

Greyed out on the server as action status is applicable to clients only.

Teams

The Teams panel displays teams and their colours that are competing on that board. Stones from different teams on the board will appear in different colours. One team can compete on many boards.

Team alliances

Teams competing against each other can form alliances for the purpose of capturing territory and opposition stones.

The Team alliances panel displays a list of alliances labelled by letter A an alliance number, followed by comma separated team numbers that belong to that alliance group. By default each team starts with its own alliance group of which it is the only member.

Illegal moves, Board Winners

Illegal moves panel and Board winners panel are blank on the server and do not display anything.

4.1.2 Data Recording

The Go*team server automatically records all movements of stones and markers inside the GoTeamLog file. There is no user interface to control it but the start and stop of the game will activate and deactivate the logging process.

4.2 Go*Team Client

This section documents how to use the client user interface to setup and conduct Go*team games. The user interface features that will be described include:

- Client GUI Overview
- Game Board

4.2.1 Client GUI Overview

The client software is loaded by executing the following command line from the Go*Team directory,

```
.\jre1.5.0_01\bin\java -classpath ./build/classes;./dist/GoTeam.jar;./lib/third-party/xercesImpl.jar;./lib/third-party/xml-apis.jar;./lib/third-party/xpp3-1.1.3.4.C.jar com.joot.jigo.JoinGame
```

Alternatively the Go*Team Client.bat batch file can be executed. The Join Game GUI will appear on the screen



Figure 19. Player me joining game host jagiellj

where:

Name – is a unique player name or virtual name. Virtual name is a name use by many players who are controlling the same player

Host – is the name of the computer on which the game server is running

Case 1

After pressing the Join button, if the entered name matches the name of an existing player who has already been registered with the game server the following GUI will appear.



Figure 20. Warning message response to an attempt to join with a name of existing player

If the name was entered incorrectly then the Cancel button allows for correction of the name by returning back to the previous GUI where a new name can be entered.



Figure 21. Chance to attempt join with another name

If the name was deliberately entered as an existing name then by pressing the OK button that player joins into the game using the settings of an existing player on the game server.

Case 2

When **the entered name doesn't match** any existing name on the game server then the Team Selection GUI will appear.

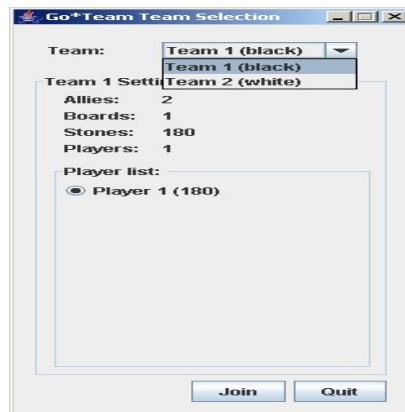


Figure 22. Selecting which team to play for on the client

where:

Team – name of the team this player is going to join. From the drop down menu the team name should be selected.

Player list – the check box of players will allow for an appropriate selection. Only one player can be selected from the group.

Case 1

After pressing the Join button, a Client GUI will appear and the user can start playing the game.

Case 2

After pressing the Quit button, user will abort the client connection to the game server, and close down the client.

Players can use the client GUI to participate in the game by observing their own view of the game and placing stones and markers.

A stone can be placed on the board by a single left mouse click on any free grid intersection of the board.

A marker can be placed on the board either by clicking the middle mouse button or by activating the markers pop up menu. The middle mouse button will place on the board only the current marker. The current marker can be selected by clicking on the marker button from a list of displayed markers.

The markers pop up menu is activated by a right mouse click on any board gridline intersection. Any mouse button except for the right one can be used to de-activate the pop up menu.

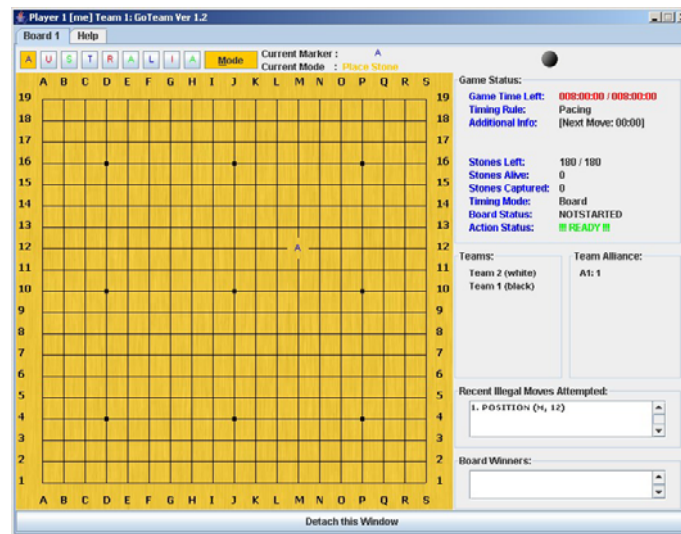


Figure 23. The Client GUI

This is the layout of the client GUI on which the following sub-elements can be distinguished:

- Game Board - where markers and stones can be placed
- Marker buttons - where the current selection of markers are displayed
- Mode button – to toggle which mode the board is in
- Game Status – display game state information
- Teams – display the teams playing on this board
- Team Alliance – display current alliances between participating teams
- Recent Illegal Moves Attempted – list of the illegal moves made by this player
- Board winners – the winning player and the winning team will be displayed here at the end of the game

4.2.2 Game Board

The player's stone colour is displayed on the right hand side above the status panel. Whenever a player moves the mouse cursor over the yellow board a grey square shape follows the mouse cursor showing the potential location of where the next marker or stone could be placed. Pressing the left button when the cursor is over the board will place a stone onto a gridline intersection of the board. The stone will match the colour of the stone displayed in the upper right hand corner.

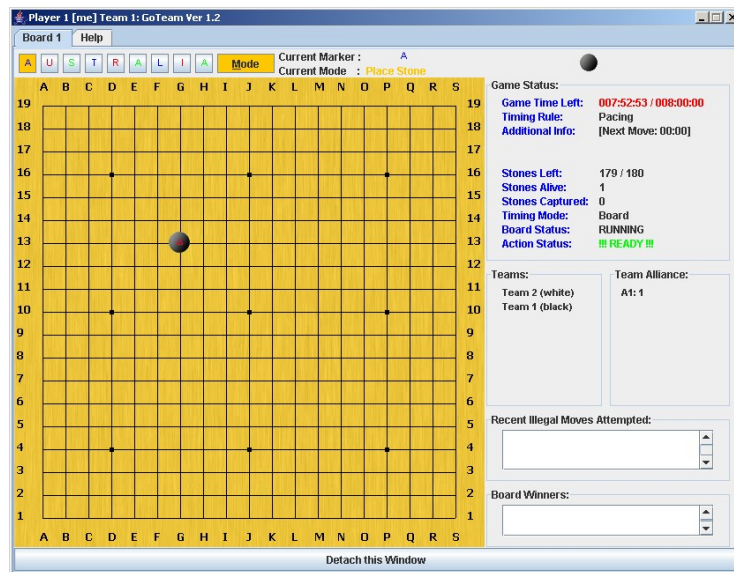


Figure 24. Stone and marker on the client GUI

A stone and a marker have been placed at location (G, 13) on the board as shown above. To activate the markers pop up menu, the right mouse should be clicked while the cursor is located over any gridline intersection of the board. The pop up menu has the following menu items:

- place marker
- delete marker
- change marker type
- change marker colour
- delete all markers
- select current marker
- change mode

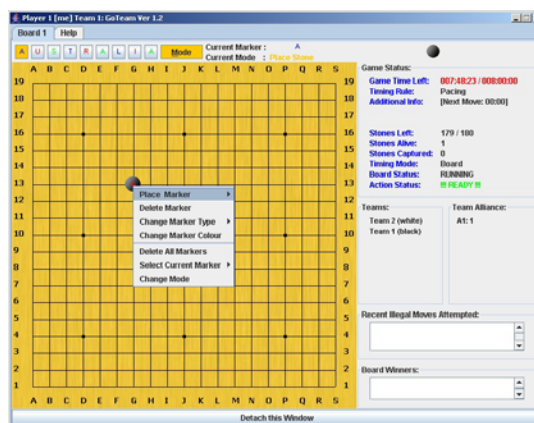


Figure 25. The Place Marker menu item

The Place Marker menu item allows for selection of any marker from a list of currently available markers.

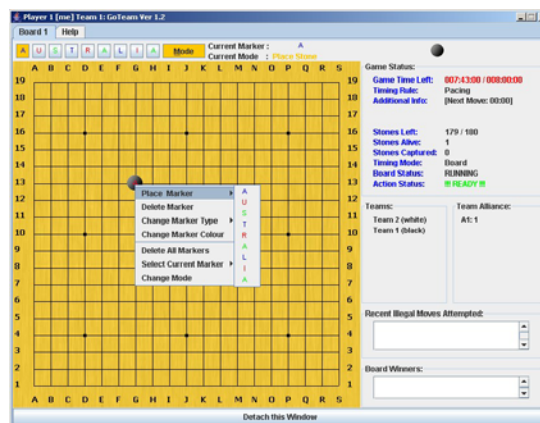


Figure 26. Place Marker list of currently available markers

The Delete Marker menu item allows for deleting the marker under the cursor. Only markers can be removed from the board. Stones cannot be deleted.

The Change Marker Type menu item allows changing the marker under the cursor to one of the marker types displayed on the list.

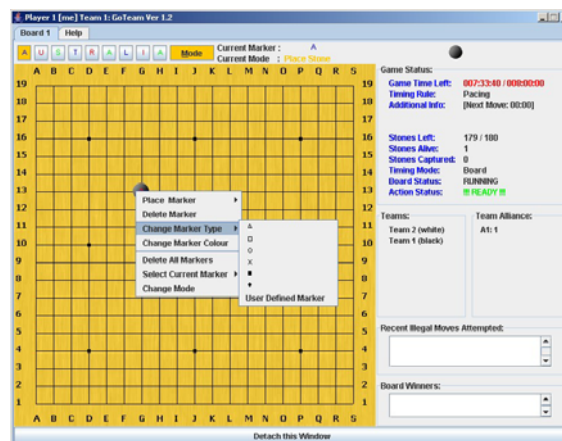


Figure 27. Change Marker Type menu item

If the **User Defined Marker** item is selected then the user is able to define their own marker as a text string of unlimited size as shown below.

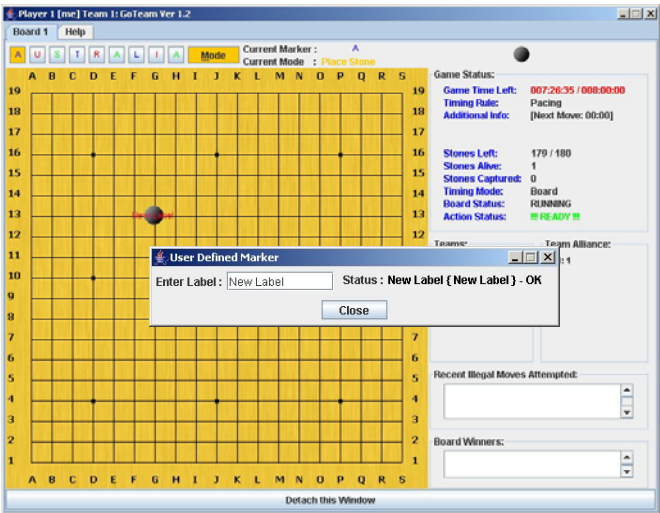


Figure 28. User Defined Marker

The Change Marker Colour menu item allows for changing of the colour of the marker under the cursor.

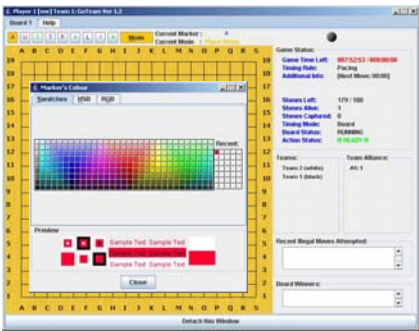


Figure 29. Changing the marker colour

The Delete All Markers menu item allows for deleting of all markers from the board. **The Select Current Marker** menu item allows selecting a marker as the default current marker from a list of available current markers.

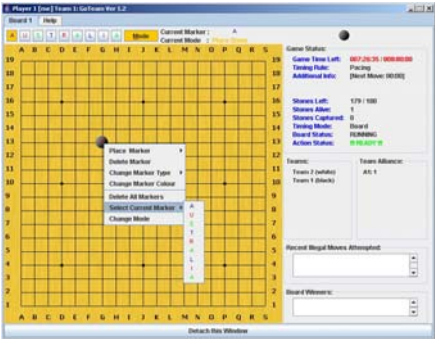


Figure 30. Selecting the current (default) marker from a list of currently available markers

The Change Mode menu item allows for changing the mode of the board. The board can be placed in one of the following modes:

- place stone - stones as well as markers can be placed on the board
- place marker - only markers can be placed on the board

To differentiate between these two modes of operation different colours for the background are displayed. When the board is the place stone mode the colour is yellow and for the place marker mode the colour is dark grey.

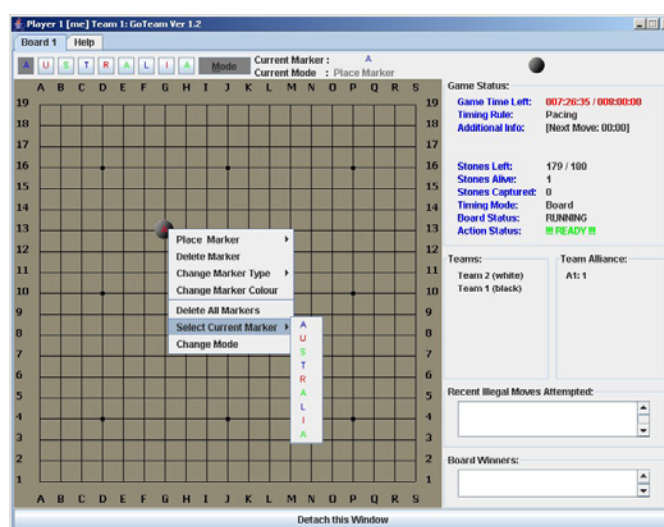


Figure 31. Grey background when board is in Marker mode

4.2.2.1 Markers

Markers can be used as an aid to trace the locations of other players' stones. In normal multiplayer team play, players do not have a full view of all the stones on the board. A viewable subset of other players' stones is dynamically calculated and displayed based on visibility rules. During play stones may seem to appear and disappear from the board for no apparent reason. In order to keep track of the positions of other players' stones, players should keep some kind of record of where stones have appeared and where they think stones are. As a recording aid, markers can be placed onto empty gridline intersections of the board, or on top of stones on the board. To place a marker, the mouse cursor should be moved over the board to the desired location. By pressing the middle mouse button the current marker is placed on the board. Another way to achieve marker placement is to press the right hand button and utilise the pop up menu.

A set of predefined marker buttons are located just above the game board and can be easily configured according to user preferences. The shape and the colour of the predefined markers can be changed at any time.

Current Marker Selection

The selection of the current marker can be done by simply left clicking on one of the predefined marker buttons. The background colour of the marker button will change to the

background colour of the board. The selected current marker is displayed next to the Current Marker label.

Marker Configuration

In order to change the shape or the colour of a predefined marker, right mouse click on the marker button to activate a pop up menu.

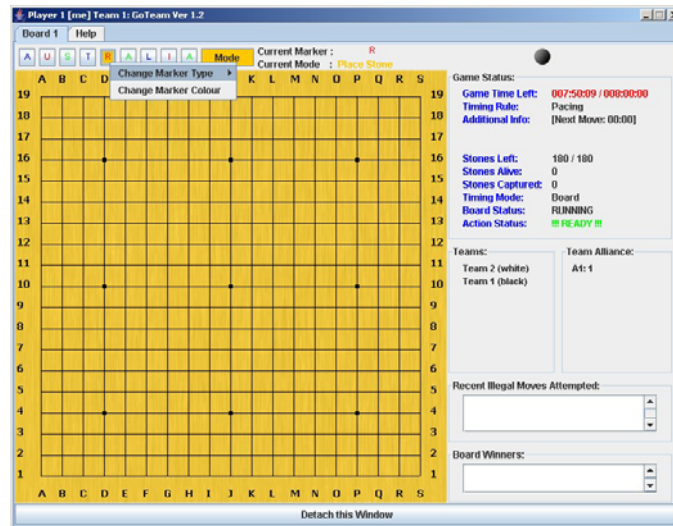


Figure 32. Changing the marker

The Change Marker Type menu item allows changing the marker under the cursor to one of the marker types displayed on the list.

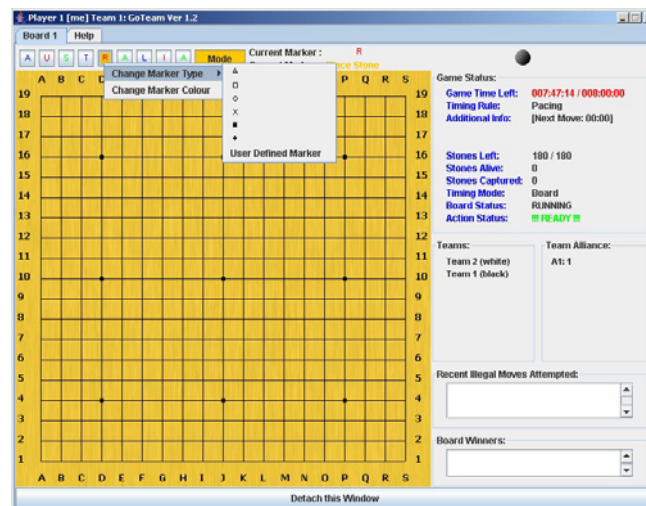


Figure 33. Changing the marker type

The Change Marker Colour menu item allows changing the colour of the marker under the cursor.

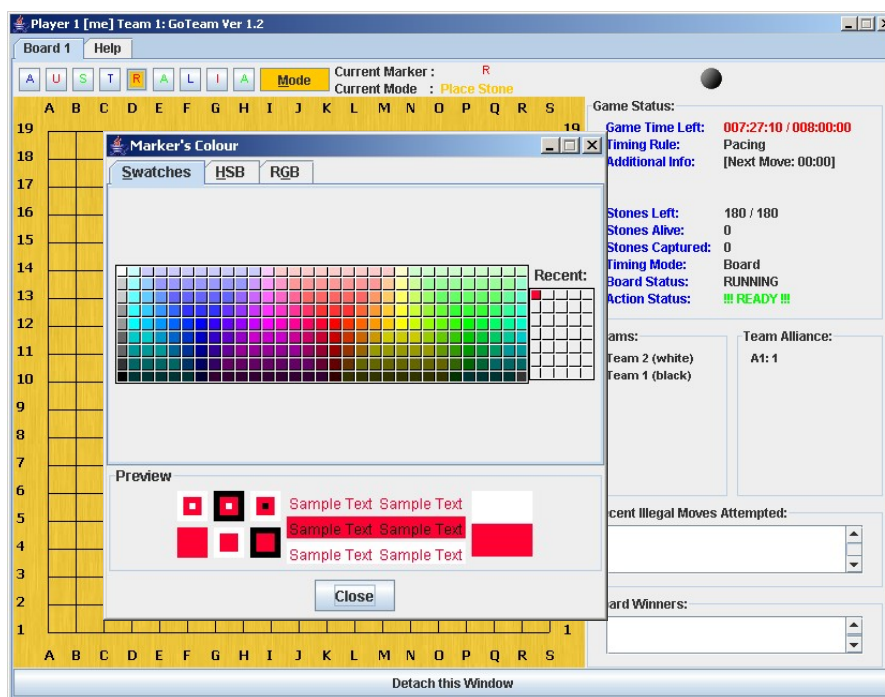


Figure 34. Changing the marker colour

4.2.2.2 Mode

In order to prevent accidental placement of stones, the board mode can be changed so that stone placement requests are disabled. To achieve this the Mode button should be pressed and the board colour will change to a grey colour to indicate the mode change to markers only mode. In this mode, only markers can be placed on the board. To return back to the normal mode where stone placement is enabled, the mode button should be pressed again.

4.2.2.3 Game Status

The game status panel contains the following information:

Game Time Left in the format of x:x:x / y:y:y

where:

x:x:x - time left to play the game

y:y:y - duration of the game

Timing Rule & Additional Info – displays one from the following list of timing rules:

Independent – all players can place stones onto the board at any time

Turn based – teams must take turns placing stones onto the board

Pacing - teams must wait for a relaxation period before placing their own stone.

Forced Delay – there is a period in which no team can make a move, and then a single team will have a period in which it has the opportunity to make a move.

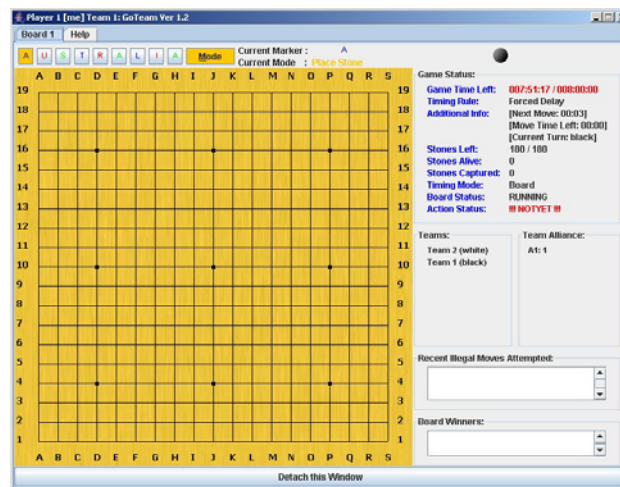


Figure 35. The Game Status panel next to the game board

The Additional Information label will display how much time is left before a move is allowed, the time left to make a move and the team taking the current turn.

Stones Left, Stones Alive and Stones Captured

The stones left label displays the number of stones left in the format x/y where
 x – current number of stones at hand for this player
 y – initial number of allocated stones for this player

The stones alive label displays the number of alive stones on the board owned by that player.

The stones captured label displays the number of opposing stones captured by that player.

Timing Mode

The timing mode displays one of the following

- Board* – the specified pacing rule applies to this board
- Team* – the specified pacing rule applies to this team

Board Status

The board can be in one of the following states:

NOTSTARTED – game has not started

RUNNING – game is running

SUSPENDED – this board is temporarily suspended

FINISH – game has finished

Action Status

The action status informs about the ability to post a stone on the board. It displays

NOTYET – placing a stone will be blocked

READY – placing a stone is allowed

4.2.2.4 Teams

The Teams panel displays teams and their colours that are competing on that board. Stones from different teams on the board will appear in different colours. One team can compete on many boards.

4.2.2.5 Team alliances

Teams competing against each other can form alliances for the purpose of capturing territory and removing opposing stones.

The Team alliances panel displays a list of alliances labelled by letter A an alliance number, followed by comma separated team numbers that belong to that alliance group. By default each team starts with its own alliance group of which it is the only member.

4.2.2.6 Recent Illegal Moves Attempted

The player can't see the full view of the game (see markers section for explanation). If there is an attempt to place a stone into a position that is already occupied by another stone it is blocked by the game server as an illegal move. In order to notify the player that his / her recent move attempt has not been accepted by the game server a message is displayed in the Recent Illegal Moves Attempted window.

4.2.2.7 Game View

This is the view of the state of the game seen by the game server.

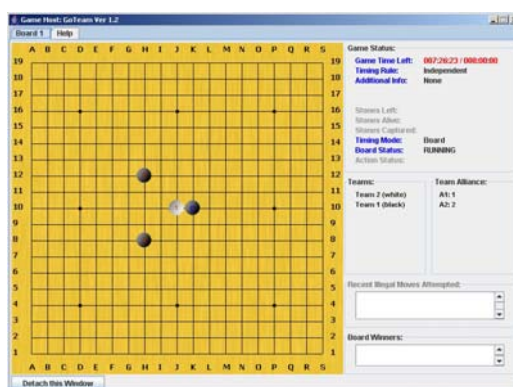


Figure 36. View at game host

This is the view of the game observed by the first player from the black team.

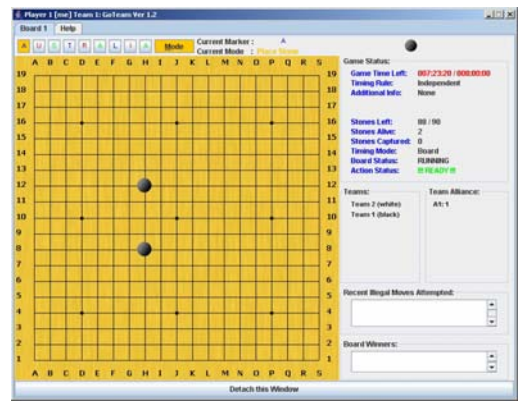


Figure 37. View at player 1, team black

This is the view of the game observed by the second player from the black team.

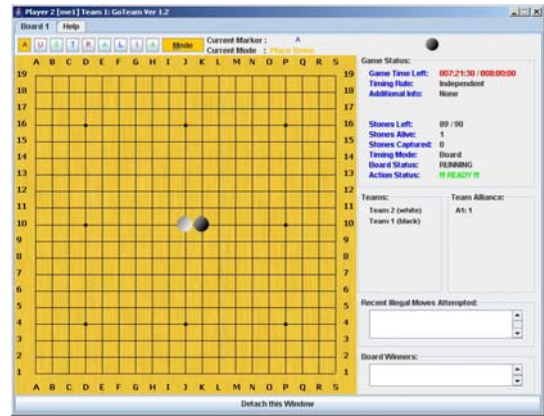


Figure 38. View at player 2, team black

Attempt to place a stone by the first player at location (J,10) will produce the following message in the Recent Illegal Moves Window.

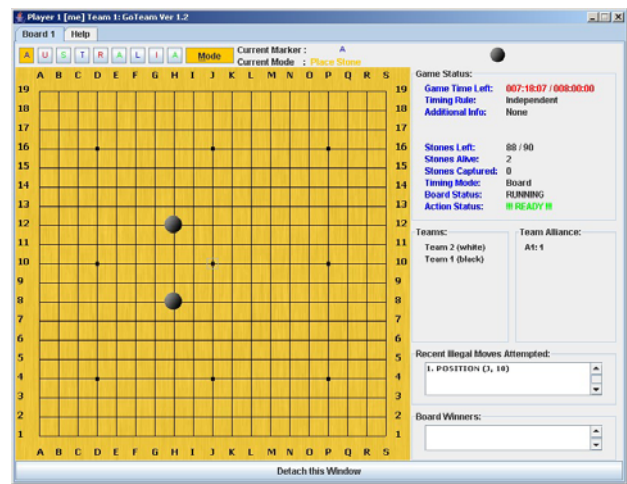


Figure 39. Illegal Move attempt by player 1, team black

Board winners

The board winners window will display the winning team and the winning player at the end of the game as in example below.

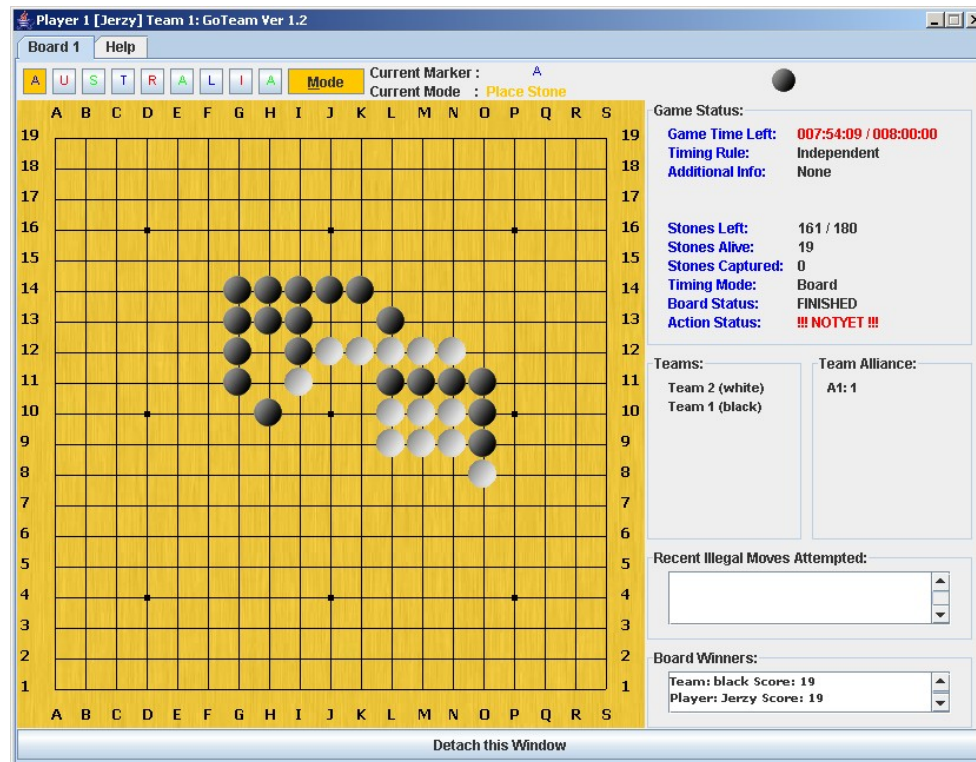


Figure 40. Board Winners panel

5. Summary

Go*Team game has been designed as a research vehicle for investigating collaboration and cooperation between team members in a competitive and dynamic environment. Go*Team is a successful demonstration that the Simulation Framework [1, 2] can be applied to different application domains. The Go*Team has been extensively used to conduct simulation experiments in teaming environment by both DSTO and University of Wollongong.

6. References

1. Jagiello, J., Eronen, M. (2007), A Simulation Framework, *MODSIM Conference, Christchurch, NZ*
2. Jagiello, J., Eronen, M. (2007), Go*Team, an instance of the simulation framework, *MODSIM Conference, Christchurch, NZ*

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19. ABSTRACT This report describes the technical capability of the Go*Team game software for experimenting with teaming arrangement in an NCW context. Go*Team is based on the ancient game of Go and the implementation is an instance of a simulation framework.									