

IT/SD TEAM PROJECT

Team Name: The Java Lamps

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Top Trumps

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1 Details of the Database

Username: m_16_2284062p

Database: m_16_2284062p

Password: 2284062p

2 Introduction

The program implements a version of Top Trumps. It reads in a text file listing the categories and values for the individual cards. A GUI allows the user to play against up to four computer players and provides all the relevant information to understand and follow the game-flow. A range of message boxes guides the user in a self-explanatory fashion. The program further connects to a database in order to allow game results to be stored. In addition, the user also has the option to write the information to a text file.

This report explains the user stories and sprint planning while also tracking the group's progress through the use of a Burn Down Chart. All assumptions made regarding the game logic are introduced and a wide variety of tests serves to demonstrate the game's functionality.

3 Current Status

The program is working and fulfils all functional requirements.

4 User Stories

User stories were generated through a group brainstorming session. Each user story was discussed in turn and the story title, description, and conversation were recorded on the front of the index cards. The team also considered the various confirmations and tests that would be required for each user story. This information was recorded on the back of the cards. The scanned in copies of all the story cards are located in Appendix A. Table 1 shows a summary of the initial user stories generated by the group.

Table 1: Initial User Stories

User Story Number	User Story	Estimated Story Points
1	Create an option to start a new game which will launch game play	16
2	Create an option to select how many players will be in the game	0.5
3	Create options for each category so that the player can select a category when it is their turn	2
4	Allow the user to exit the game	0.5
5	Allow the user to save the game statistics to the database	1
6	Provide an option for the user to view the game statistics	1
7	Provide an option to discard the results from the current game so that they will not be added to the database	1
8	Allow the user to save the game statistics to a text file	1
	Total Estimated Story Points	23

Table 1 also contains the estimated story points for each user story. The story points were again generated through a group session where each participant estimated the number of story points per user story in confidence. The team then discussed the estimations and explained their thought processes until everyone converged on an agreed value.

User story 1 has an estimated story point value of 16 which is significantly higher than any of the other user stories. The team therefore decided that this story could be considered as an epic and should be broken down further into smaller user stories. Table 2 details how the epic was broken down further into user stories 1.1 to 1.7.

Table 2: Expanded user stories

User Story Number	User Stories	Estimated Story Points
1	Create an option to start a new game which will launch game play	
1.1	Read in cards from deck.txt	1
1.2	Shuffle Cards	2
1.3	Deal cards	1
1.4	Pick random player to begin	1
1.5	Allow computer to select a category	4
1.6	Compare scores and pick winner	4

1.7	Handle draw	4
2	Create an option to select how many players will be in the game	0.5
3	Create options for each category so that the player can select a category when it is their turn	2
4	Allow the user to exit the game	0.5
5	Allow the user to save the game statistics to the database	1
6	Provide an option for the user to view the game statistics	1
7	Provide an option to discard the results from the current game so that they will not be added to the database	1
8	Allow the user to save the game statistics to a text file	1
	Total Story Points	24

5 Sprint Planning and Review Reports

5.1 Sprint 1: Planning Report

Scrum master: Stephanie Man (SM)

Scrum Team: Anupam Chakraborty (AC), Kirsten Miller (KM), Hannah Pankow (HP), Susie Smart (SS)

Table 3 contains the product backlog for sprint 1. The user stories selected for sprint 1's backlog were chosen as they were the main user stories that would need to be completed for the game to function. The order in which the team planned to complete these tasks was based on a logical process where some user stories naturally progress to the next. For example, "Read in cards from deck" had to be completed before "Shuffle cards" could be implemented. The tasks to complete each user story were divided between the scrum team to ensure they would be completed in the time boxed sprint.

Table 3: Sprint 1 User Stories

User Story Number	Sprint 1: User Stories	Estimated Story Points	Allocated Team member
1.1	Read in cards from deck.txt	1	KM
1.2	Shuffle Cards	2	KM & SS
1.3	Deal cards	1	KM
1.4	Pick random player to begin	1	KM

1.5	Allow computer to select a category	4	KM & SS
3	Create options for each category so that the player can select a category when it is their turn	2	SS
	Total Story Points	11	

During this two-week sprint, AC and HP were also tasked with designing the database for the system while SM took on the responsibility of generating the documentation including collating all the user stories.

5.2 Sprint 1: Review Report

Throughout the first sprint the team reported their individual progress at regular stand up meetings and the actual story points used for each user story were recorded. The actual story point values are displayed in Table 4.

Table 4: Sprint 1 Actual Story Points

User Story Number	Sprint 1: User Stories	Estimated Story Points	Actual Story Points
1.1	Read in cards from deck.txt	1	0.5
1.2	Shuffle Cards	2	0.5
1.3	Deal cards	1	2
1.4	Pick random player to begin	1	1
1.5	Allow computer to select a category	4	2
3	Create options for each category so that the player can select a category when it is their turn	2	2
	Total Story Points	11	8

Table 4 illustrates that in some cases the estimated story points were too high, for example in 1.1 and 1.2 the user stories were simpler to implement than predicted. However, there were also user stories which took longer than initially expected for example 1.3 “Deal cards” was more complex and took longer to debug than planned. Overall, all the user stories in sprint 1 were completed in fewer days than estimated and so the team was in a strong position going into sprint 2.

The team also produced a plan for the database design and collated the user story cards during this sprint.

The main lessons learned during this sprint were that the team worked well whilst pair programming. It was therefore decided that this would continue onto the next sprint with SS and KM working in a team and HP and SM working as another pair.

5.3 Sprint 2: Planning Report

Scrum master: Stephanie Man (SM)

Scrum Team: Anupam Chakraborty (AC), Kirsten Miller (KM), Hannah Pankow (HP), Susie Smart (SS)

Table 5 contains the product backlog for sprint 2. The user stories selected for sprint 2's backlog were the remaining user stories identified in the original brainstorming session. The tasks to complete each user story were divided between the scrum team to ensure they would be completed in the time boxed sprint.

Table 5: Sprint 2 User Stories

User Story Number	Sprint 2: User Stories	Estimated Story Points	Allocated Team member
1.6	Compare scores and pick winner	4	KM & SS
1.7	Handle draw	4	KM
2	Create an option to select how many players will be in the game	0.5	SS
4	Allow the user to exit the game	0.5	SS
5	Allow the user to save the game statistics to the database	1	HP & SM
6	Provide an option for the user to view the game statistics	1	HP
7	Provide an option to discard the results from the current game so that they will not be added to the database	1	HP
8	Allow the user to save the game statistics to a text file	1	HP & SM
	Total Story Points	13	

During this two-week sprint, AC was responsible for updating the documentation including the Burn Down chart and product back log. SM continued as the Scrum Master, running the regular stand ups and supporting the team throughout the sprint.

5.4 Sprint 2: Review Report

Throughout the second sprint the team continued to report their individual progress at regular stand up meetings and the actual story points used for each user story were again recorded. The actual story point values are displayed in Table 6.

Table 6: Sprint 2 Actual Story Points

User Story Number	Sprint 2: User Stories	Estimated Story Points	Actual Story Points
1.6	Compare scores and pick winner	4	4
1.7	Handle draw	4	8
2	Create an option to select how many players will be in the game	0.5	0.5
4	Allow the user to exit the game	0.5	0.5
5	Allow the user to save the game statistics to the database	1	4
6	Provide an option for the user to view the game statistics	1	2
7	Provide an option to discard the results from the current game so that they will not be added to the database	1	0.5
8	Allow the user to save the game statistics to a text file	1	2
	Total Story Points	13	21.5

Table 6 illustrates that in some cases the estimated story points were too high, for example in 7 the user story was simpler to implement than predicted. However, there were also user stories which took longer than initially expected for example 1.7 “Handle draw” was far more complex, taking almost double the story points than were estimated.

At the end of sprint 2 all the user stories had not been completed and user stories 6 to 8 had to be planned and completed in an additional period. It was clear that the two sprints had not been as evenly split as originally thought.

The team also produced continued comments to keep the documentation up to date during this sprint.

The main lessons learned during this sprint were that it is easy to underestimate the story points. The team identified that 1.7 “Handle draw” could have been made more specific and potentially broken down further which might have helped the team predict the story points more accurately.

6 Burn Down Chart

The estimated vs actual story points were monitored throughout both sprints with the use of a Burn Down Chart. The Burn Down Chart is shown in Figure 1 and clearly illustrates how the actual project progression compared with the predicted user stories. The actual Burn Down trend line goes below zero as not all of the story points were completed within the second sprint. The remaining stories were completed in the next couple of days as they required more time for debugging than the team had predicted.

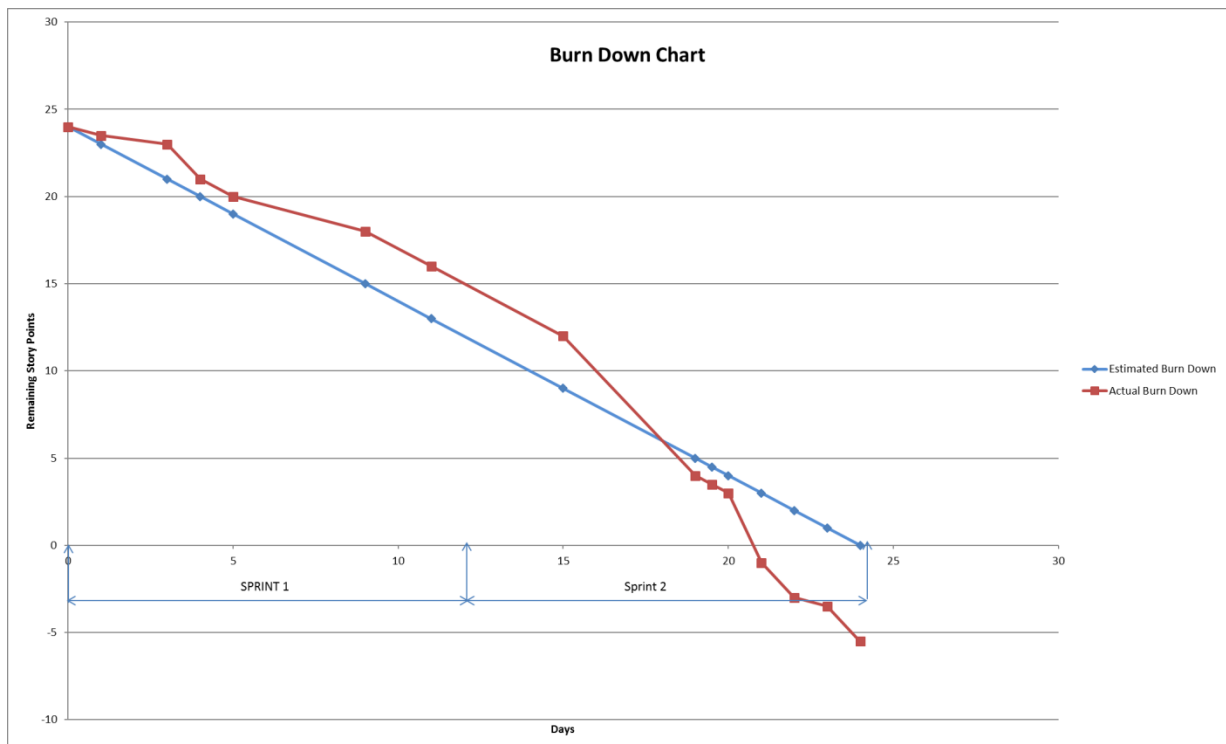


Figure 1: Burn Down Chart

7 Assumptions

The following assumptions have been made during the design and implementation of the Top Trump's game:

1. A draw won't continue until the point where there are only cards in the communal pile
2. If a draw occurs and the winner of the previous round is not part of the draw we have assumed that the last player (e.g. player 4 is the last player out of players 3 and 4) in the draw round gets to pick the next category
3. The user will not be able to start a new game during game play
4. When cards are dealt and the number of players is uneven, we have assumed that player 1 will always get the extra card
5. We have assumed that there will always be 5 categories and 40 cards in a deck

6. We have assumed that deck.txt will always be formatted correctly
7. We have assumed that the category descriptions will not require a text width greater than 15 and that the card description will not require a text width greater than 30
8. When players are not included in a game, they are given a score of 0 in the database for the number of rounds won

8 Testing

The information displayed in Table 7 includes the tests that were carried out and the input data used to carry out the tests. The image column contains a reference to a screen shot in Appendix B which evidences that the test has been completed. The results column is used to mark whether the test was passed. The testing aims to assess every aspect of the functionality of the game.

Table 7: Test Details

Test Number	Test	Input	Result
1	Check the deck file is read in and card objects created correctly	Sample input file and new test input file	passed
2	Check the deck is shuffled	Test for multiple games	passed
3	Check the cards have been dealt to each player	Test for all possible number of players	passed
4	Check that the player who starts is randomly selected	Test for all possible number of players	passed
5	Check that comp player correctly selects the highest category on their top card	Test for multiple cards	passed
6	Check that user selection of category is registered correctly	Test for each category	passed
7	Check that the winner of each round is correctly calculated	Test for multiple games	passed
8	Check that the cards in round are players top cards	Test for multiple rounds	passed
9	Check that the current card displayed in the GUI correctly updates throughout game play	Test for multiple rounds	passed
10	Check that for the category	Test for multiple	passed

	selected the corresponding value from each players card is displayed on the GUI	rounds	
11	Check that the category selected by the current player is displayed on the GUI	Test for multiple rounds	passed
12	Check that the user is unable to select a radio button unless it is their turn	Test for multiple computer turns	passed
13	Check that the user is unable to select view statistics or new game during game play	Test for multiple rounds	passed
14	Check that cards are correctly distributed to the winners hand and the corresponding GUI information is updated	Test for multiple Rounds	passed
15	Check the winner of the round gets the next choice of the category	Test for multiple rounds	passed
16	Check that the winner of the round is clearly displayed on the GUI	Test for multiple rounds	passed
17	Ensure that when a draw occurs that all players in the rounds cards are placed in the communal pile and this is displayed in the GUI	Test for multiple games	passed
18	Check that only the players who drew are in the consecutive round and the winner gets the cards from the other players and those in the communal pile	Test for multiple games	passed
19	Check the scenario where multiple consecutive draws occur	Test for multiple games Test using draw test pack	passed
20	Check that when a player runs out of cards they stay out of the game	Test for multiple games	passed
21	Check that the player with all the cards in the deck wins the game	Test for multiple games	passed
22	Check that the user has an option to save the game data or exit or play again	Test for multiple games	passed

23	Check that if the user chooses to save the data that this information is correctly stored in the database	Test for multiple games	passed
24	Check that the user can view the overall game statistics as specified in the brief	Test for multiple games	passed
25	Check that the overall statistics can be output to a text file	Test for multiple games	passed
26	At the end of a game check that the player can start a new game	Test for multiple games	passed
27	Check that the specified information for testing is printed to the console at the correct points during game play	Test for multiple games	passed
28	Check all database tables	Test for multiple games	

* The draw test pack has cards with lots of equal values to ensure frequent draws occur.

Appendix A: User Stories

User story points were recorded on sticky notes during the brainstorming session. They have therefore been added to the user story cards in the blue circles.

16

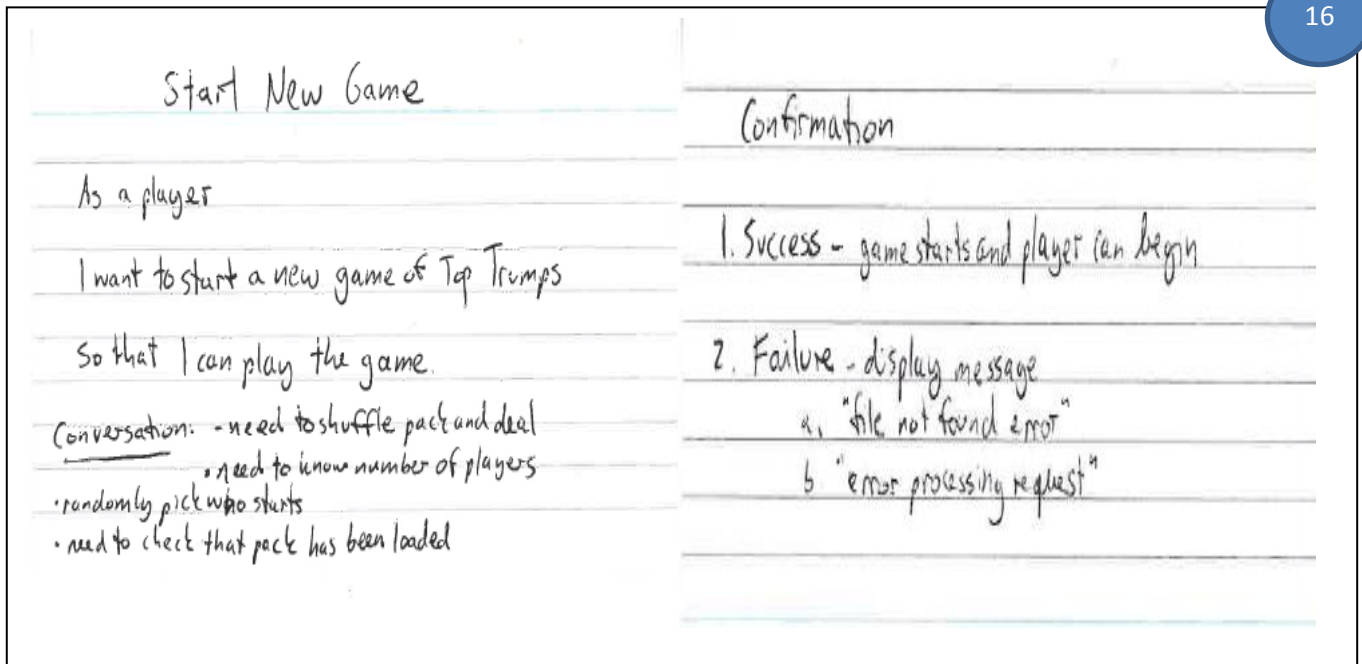


Figure 2: User story 1

1

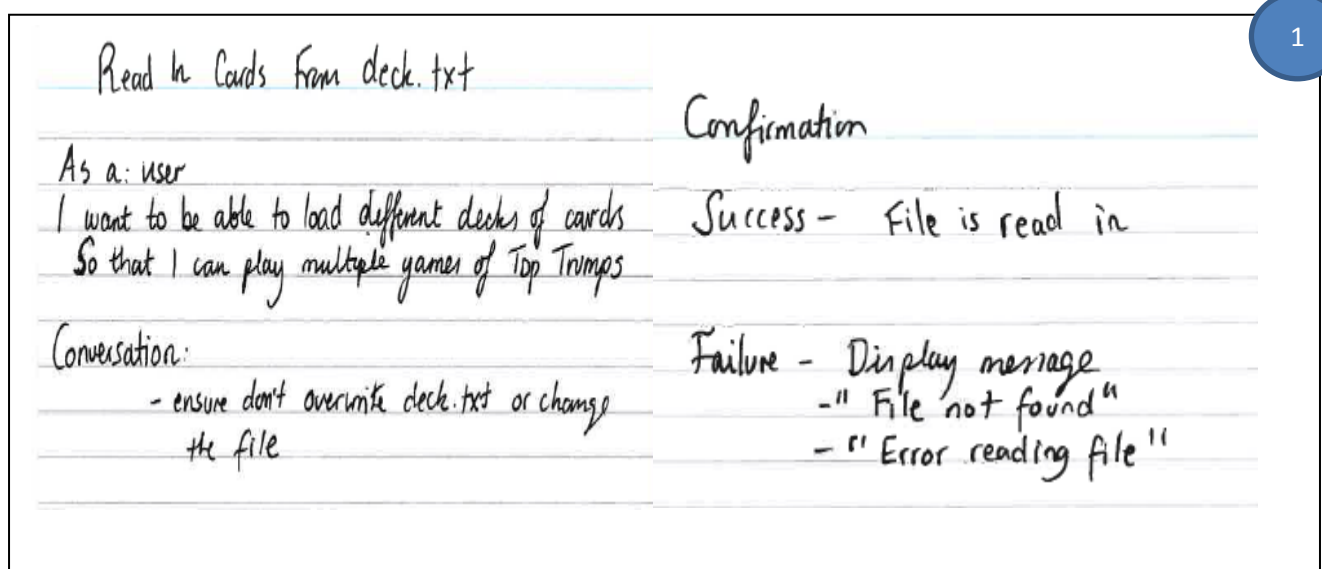


Figure 3: User Story 1.1

Shuffle Cards

As a user

I want the decks of cards shuffled
So that the game can start

Conversation:

- initiating temporary card deck

Confirmation

Success - cards dealt to each player are different

Failure - display message
- players dealt same cards at the start of each game

Figure 4: User Story 1.2

Deal Cards

As a user

I want the deck of cards dealt
So that the game can start

Conversation

- cards should be dealt evenly between the players in the game
- extra card?

Confirmation

Success - Players have the same number of cards and if 1 card left over, 1 player gets extra card

Failure - Players with different number of cards
- display message
"error processing request"

Figure 5: User Story 1.3

Pick Random Players To Begin

As a user
I want a random player selected
So that the game can start

Conversation

- we need to know how many players are in the game

Confirmation

Success - Randomized players at the beginning of each game

Failure - Same player starts each game
- no players selected
- error message

Figure 6: User Story 1.4

Allow Computer To Select A Category

As a user
I want the computer player to select a category
So that they can complete their turn and game continues

Conversation:

- need to select the category with the highest value

Confirmation

Success - Computer selects best category when it's their turn

Failure - Display error - array out of bounds?
- Error message
- no category selected?
- same category selected each time?

Figure 7: User Story 1.5

Compare Scores And Pick Winner

As a user

I want to see who has won the game

So that I know who won the game

Conversation:

- need to know which player has all of the cards at the end of the game as this is the winner

Confirmation

Success - winner of the game is shown in pop up message

Failure - display message
- array out of bounds exception?

Figure 8: User Story 1.6

Handle Draw

As a user

I want draw situations to be dealt with

So that the game can continue

Conversation:

During a draw players cards will need to be stored in a communal pile. Only the players that drew will continue in the next round.

Confirmation

Success - When a draw occurs only the players in the draw play the next round + they get the previous round cards.

Failure - Display message
- Draw is not registered
- Cards do not get put in communal pile or not retrieved from it.
- wrong players in draw

Figure 9: User Story 1.7

Select number of players

As a player

I want to select how many players are in the game
So that I can play the game with the desired number of opponents

Conversation:

- select number of opponents or number of players?
- Drop-down menu so we don't need to do input testing
- max number of players: 5, min: 2

Confirmation

Success - selected number of players is added to game
and game starts with correct number of players in it

Failure

- wrong number of players passed on to game
- no players selected
- ⇒ Dialog box reminder: select players

Figure 10: User story 2

Player Selects Category On Card For Round

As a: Player

So that: I can hopefully win card from my opponents

Conversation:

- Developer:
- Categories as radio or normal buttons - don't have to handle user input?
 - Are you sure option? Might click normal button by accident
 - If player beats opponents their cards should be added to deck & given another turn
 - If player loses round, winner gets all cards & maintains category choice
 - If draw, cards go into communal pile; player chooses category & winner gets all cards including communal pile (if draw, repeat)
 - Compare all values from each card to determine winner

Confirmation

Success - player selects category and then either loses card to opponents or gain cards from opponents (or draw)

Failure - display message
"error processing request"

Figure 11: User Story 3

Exit Game

As a player
I want to exit the game
So that I can do something else

Conversation:

> Use exit on close() method

Confirmation

Success - program stops running

Failure - display message: "error
processing request"

Possible checks - it should no longer
be visible to the naked
eye

Figure 12: User Story 4

Player Updates Game Statistics to Database

As a: player
I want to: update the statistics of my game
So that: I can view my statistics later & track progress

Conversation:

- Need to keep a record of all the necessary stats throughout the game so we can easily add to database at end
- All computations should be in SQL
- If player quits mid game stats will not be added

Confirmation

Success - program stops running

Failure - display message

- "error processing request"
- "No connection to database"
- "SQL query failure"

Figure 13: User Story 5

Player Views Statistics

As a : player

I want to: see my statistics of previous games.

So that: I can learn more about my game history

Conversation

- should be an SQL class for accessing database & running SQL queries
- display statistics in one report to minimize unnecessary features
- show report in JFrame, closing JFrame doesn't close program
- if player has never played, all stats would be 0

Confirmation

Success - Report is displayed in separate GUI

Failure - Display message

- "error processing request"
- report is empty
- database connection unsuccessful
- SQL query error

Figure 14: User Story 6

Player doesn't save statistics

As a player

I want to not add the statistics of the previous game to the database

So that it is not included in my game statistics

Conversation:

- We need to have a pop-up at end of game to facilitate this.

Confirmation

Success - Information isn't saved and player is returned to the home GUI (with new game or view stats option)

Failure - display message "error processing request"

Figure 15: User Story 7

Player Saves Statistics To File

As a: player

I want to: save my game statistics to a file

So that: I can access them later/send them to a friend

Conversation

- Should there be an option to name the file or should it just be toptrumps Out?
- If it was only one file we would overwrite it everytime

Confirmation

Success - Report is displayed in separate GUI

Failure - Display message

- "error processing request"

- file not found

Figure 16: User Story 8

7 Appendix B: Testing Screenshots

Test Number	Image
1	
2	<p>(deck above shuffled)</p>

3

2 Players

You	Player 1			
Cards: 20	Cards: 20			

3 Players

You	Player 1	Player 2		
Cards: 14	Cards: 13	Cards: 13		

4 Players

You	Player 1	Player 2	Player 3	
Cards: 10	Cards: 10	Cards: 10	Cards: 10	

5 Players

You	Player 1	Player 2	Player 3	Player 4
Cards: 8	Cards: 8	Cards: 8	Cards: 8	Cards: 8

4

2 Players

You	Player 1			
Cards: 20	Cards: 20			

Game Message

i Player 1 picks first!

OK

3 Players

You	Player 1	Player 2		
Cards: 14	Cards: 13	Cards: 13		

Game Message

i Player 2 picks first!

OK

4 Players

You	Player 1	Player 2	Player 3	
Cards: 10	Cards: 10	Cards: 10	Cards: 10	

Game Message

i You go first!

OK

5 Players



5

(1) Example: Player 2 chooses

CURRENT CARDS IN PLAY:

Thescelochelomimus 39 5 6 28 24
Megalosaurus 9 9 8 6 9
Chlorodon 10 37 18 11 32
Stegosaurus 4 3 8 1 8
Brachiolodon 37 1 32 15 41

Player 3 Player 4

Cards: 7 Cards: 12

Score: 8 Score: 41

intelligence

(2) Example: Player 1 chooses

CURRENT CARDS IN PLAY:

Agilinychus 28 40 5 48 10
Haplocephalolestes 14 3 37 42 43
Protoceratops 9 5 4 7 10
Aepydon 23 10 11 36 27
Saurolophus 7 1 10 7 8

Player 1 Player 2 Player 3

Cards: 6 Cards: 1 Cards: 1

Score: 43 Score: 10 Score: 27

The chosen category is: intelligence

(3) Example: Player 3 chooses

CURRENT CARDS IN PLAY:

Chlorodon 10 37 18 11 32
Parasaurolophus 7 7 1 3 4
Aepydon 23 10 11 36 27

Player 3

Cards: 5

Score: 36

ferocity

6

(1) Height

height 40 ☒

weight 20 ☐

length 9 ☐

ferocity 33 ☐

intelligence 14 ☐

Select Category

You Player 1

Cards: 19 Cards: 21

Score: 40 Score: 37

The chosen category is: height

(2) Weight

height	10	<input type="radio"/>
weight	9	<input checked="" type="radio"/>
length	8	<input type="radio"/>
ferocity	7	<input type="radio"/>
intelligence	5	<input type="radio"/>
<input type="button" value="Select Category"/>		

You	Player 1		
Cards: 20	Cards: 20		
Score: 9	Score: 35		
The chosen category is: weight			

(3) Length

height	28	<input type="radio"/>
weight	14	<input type="radio"/>
length	5	<input checked="" type="radio"/>
ferocity	38	<input type="radio"/>
intelligence	15	<input type="radio"/>
<input type="button" value="Select Category"/>		

You	Player 1		
Cards: 19	Cards: 21		
Score: 5	Score: 6		
The chosen category is: length			

(4) Ferocity

height	14	<input type="radio"/>
weight	3	<input type="radio"/>
length	37	<input type="radio"/>
ferocity	42	<input checked="" type="radio"/>
intelligence	43	<input type="radio"/>
<input type="button" value="Select Category"/>		

You	Player 1		
Cards: 18	Cards: 22		
Score: 42	Score: 3		
The chosen category is: ferocity			

(5) Intelligence

height	19	<input type="radio"/>
weight	36	<input type="radio"/>
length	1	<input type="radio"/>
ferocity	31	<input type="radio"/>
intelligence	47	<input checked="" type="radio"/>
<input type="button" value="Select Category"/>		

You	Player 1		
Cards: 17	Cards: 23		
Score: 47	Score: 25		
The chosen category is: intelligence			

7

Example 1:

Game Message

Player 1 won!

OK

You	Player 1	Player 2	Player 3	
Cards: 10	Cards: 10	Cards: 10	Cards: 10	
Score: 1	Score: 38	Score: 9	Score: 11	

Example 2:



Example 3:



8

Example 1:

(Human)

```
***USER'S DECK***
Velociraptor 3 5 12 10
Tyrannovenator 26 10 38 9 39
Protoceratops 9 5 4 7 10
Megalosaurus 9 9 8 6 9
Aepydonbator 25 20 37 34 49
Aepydon 23 10 11 36 27
Brachiolodon 37 1 32 15 41
Lophopteryx 22 20 27 49 13
Lurdupodosaurus 45 43 16 48 50
Styracosaurus 7 3 4 1 1
Styracopelix 21 3 34 46 35
Rugoscephalovenator 40 35 33 48 44
Archaeosaurus 40 20 9 33 14
```

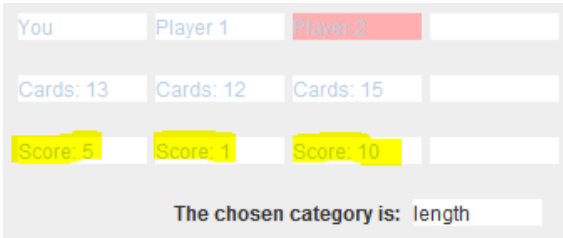
(Player 1)

```
***COMP 1'S DECK***
Therizinopodogryphus 19 36 1 31 47
Chlorodon 10 37 18 11 32
Thescelochelomimus 39 5 6 28 24
TRex 6 6 12 9 9
Agilinychus 28 40 5 48 10
Parasaurolophus 7 7 1 3 4
Macrosuchus 28 14 5 38 15
Carnotaurus 5 6 7 9 8
Xiaosaurus 10 6 5 7 2
Thecocercorex 11 40 45 35 3
Rugospelix 43 45 11 31 25
Kentrosaurus 35 18 49 45 39
```

(Player 2)

```
***COMP 2'S DECK***
Saurolophus 7 1 10 7 8
Brachiosaurus 12 8 16 2 6
Megalodon 44 23 13 24 3
Haplocephalolestes 14 3 37 42 43
Nanorhinogryphus 5 20 35 37 10
Iguanodon 2 2 3 1 9
Aviolomoloch 2 16 6 45 44
Campopelta 5 21 48 30 42
Oviraptor 8 7 4 3 2
Cyclodromeus 48 46 13 22 11
Stegosaurus 4 3 8 1 8
Ornithomimus 10 9 8 7 5
Hadrospondylus 5 10 1 11 3
Riojasaurus 6 1 4 7 7
Plateocercodromeus 15 4 46 16 24
```

(compare scores)



Example 2:

(Human)

```
***USER'S DECK***
Styracosaurus 7 3 4 1 1
Haplocephalolestes 14 3 37 42 43
Aviolomoloch 2 16 6 45 44
Thescelochelomimus 39 5 6 28 24
Riojasaurus 6 1 4 7 7
Stegosaurus 4 3 8 1 8
```

(Player 1)

```
***COMP 1'S DECK***
Trex 6 6 12 9 9
Onnithomimus 10 9 8 7 5
Hadrospondylus 5 10 1 11 3
Rugospelix 43 45 11 31 25
Xiaosaurus 10 6 5 7 2
Lurdupodosaurus 45 43 16 48 50
Plateocercodromeus 15 4 46 16 24
Lophopteryx 22 20 27 49 13
Oviraptor 8 7 4 3 2
Aepydon 23 10 11 36 27
Tyrannovenator 26 10 38 9 39
Nanorhynchogryphus 5 20 35 37 10
Macrosuchus 28 14 5 38 15
Megalodon 44 23 13 24 3
Archaeosaurus 40 20 9 33 14
```

(Player 2)

```
***COMP 2'S DECK***
Aepydonbator 25 20 37 34 49
Chlorodon 10 37 18 11 32
Velociraptor 3 5 5 12 10
Agilinyx 28 40 5 48 10
Therizinopodogryphus 19 36 1 31 47
Brachiolodon 37 1 32 15 41
```

(Player 3)

```
***COMP 3'S DECK***
Saurolophus 7 1 10 7 8
Styracopelix 21 3 34 46 35
Protoceratops 9 5 4 7 10
Megalosaurus 9 9 8 6 9
Iguanodon 2 2 3 1 9
Carnotaurus 5 6 7 9 8
```

(Player 4)

```
***COMP 4'S DECK***
Kentrosaurus 35 18 49 45 39
Parasaurolophus 7 7 1 3 4
Camptopelta 5 21 48 30 42
Thecocercorex 11 40 45 35 3
Cyclodromeus 48 46 13 22 11
Rugoscephalovenator 40 35 33 48 44
```

(compare scores)

You	Player 1	Player 2	Player 3	Player 4
Cards: 6	Cards: 16	Cards: 6	Cards: 6	Cards: 6
Score: 4	Score: 12	Score: 37	Score: 10	Score: 49
The chosen category is: length				

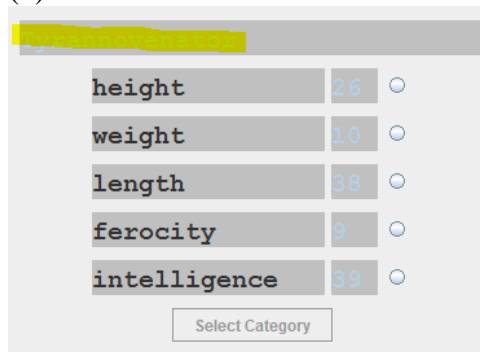
9

Example 1:

```
***USER'S DECK***
Tyrannovenator 26 10 38 9 39
Protoceratops 9 5 4 7 10
Megalosaurus 9 9 8 6 9
Aepydonbator 25 20 37 34 49
Aepydon 23 10 11 36 27
Brachiolodon 37 1 32 15 41
Lophopteryx 22 20 27 49 13
Lurdupodosaurus 45 43 16 48 50
Styracosaurus 7 3 4 1 1
Styracopelix 21 3 34 46 35
Rugoscephalovenator 40 35 33 48 44
Archaeosaurus 40 20 9 33 14
```

Expect GUI to display cards in order above (sample of 2)

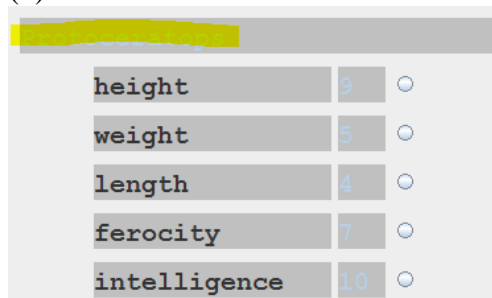
(1)



height	26	<input type="radio"/>
weight	10	<input type="radio"/>
length	38	<input type="radio"/>
ferocity	9	<input type="radio"/>
intelligence	39	<input type="radio"/>

Select Category

(2)



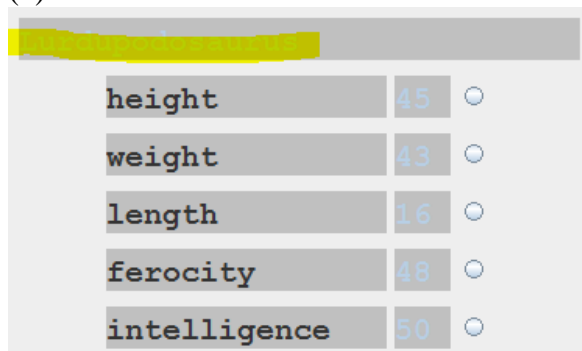
height	9	<input type="radio"/>
weight	5	<input type="radio"/>
length	4	<input type="radio"/>
ferocity	7	<input type="radio"/>
intelligence	10	<input type="radio"/>

Example 2:

```
***USER'S DECK***  
Lurdupodosaurus 45 43 16 48 50  
Hadrospondylus 5 10 1 11 3  
Iguanodon 2 2 3 1 9  
Therizinopodogryphus 19 36 1 31 47  
Chlorodon 10 37 18 11 32  
Rugospelix 43 45 11 31 25  
Protoceratops 9 5 4 7 10  
Tyrannovenator 26 10 38 9 39
```

Expect GUI to display cards in order above (sample of 2)

(1)



height	45	<input type="radio"/>
weight	43	<input type="radio"/>
length	16	<input type="radio"/>
ferocity	48	<input type="radio"/>
intelligence	50	<input type="radio"/>

(2)

height 5 ☐

weight 10 ☐

length 1 ☐

ferocity 11 ☐

intelligence 3 ☐

10

Example 1:

```
-----  
CURRENT CARDS IN PLAY:  
-----  
Hadrospondylus 5 10 1 11 3  
Brachiosaurus 12 8 16 2 6  
Camptopelta 5 21 48 30 42  
Macrosuchus 28 14 5 38 15  
Haplocephalolestes 14 3 37 42 43  
-----
```

You	Player 1	Player 2	Player 3	Player 4
Cards: 12	Cards: 7	Cards: 7	Cards: 7	Cards: 7
Score: 11	Score: 2	Score: 30	Score: 38	Score: 42
The chosen category is: ferocity				

Example 2:

```
-----  
CURRENT CARDS IN PLAY:  
-----  
Chlorodon 10 37 18 11 32  
Thescelochelomimus 39 5 6 28 24  
Megalosaurus 9 9 8 6 9  
Cyclodromeus 48 46 13 22 11  
Kentrosaurus 35 18 49 45 39  
-----
```

You	Player 1	Player 2	Player 3	Player 4
Cards: 9	Cards: 4	Cards: 4	Cards: 9	Cards: 14
Score: 10	Score: 39	Score: 8	Score: 48	Score: 35
The chosen category is: height				

Example 3:

```
-----
CURRENT CARDS IN PLAY:
-----

Chlorodon 10 37 18 11 32
Styracopelix 21 3 34 46 35
Stegosaurus 4 3 8 1 8
Xiaosaurus 10 6 5 7 2
-----
```

You	Player 1	Player 2	Player 3	
Cards: 9	Cards: 9	Cards: 9	Cards: 13	
Score: 10	Score: 21	Score: 4	Score: 10	
The chosen category is: height				

11

Example 1:

Game Message
 Player 1 won!

OK

You	Player 1	Player 2	Player 3	
Cards: 8	Cards: 12	Cards: 8	Cards: 12	
Score: 7	Score: 46	Score: 32	Score: 4	
The chosen category is: length				

Example 2:

length49☒

45☐

39☐

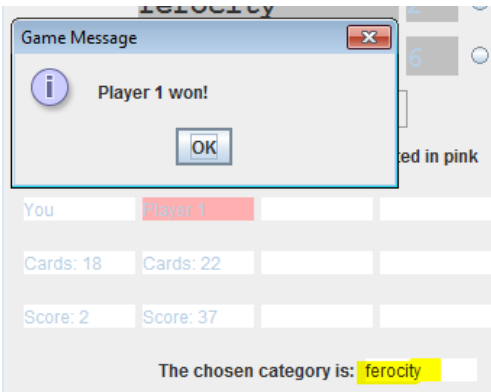
Game Message
 You won!

OK

The current player is highlighted in pink

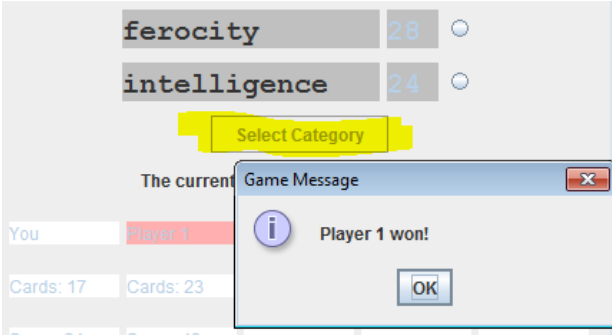
You	Player 1	Player 2	
Cards: 14	Cards: 13	Cards: 13	
Score: 49	Score: 27	Score: 18	
The chosen category is: length			

Example 3:

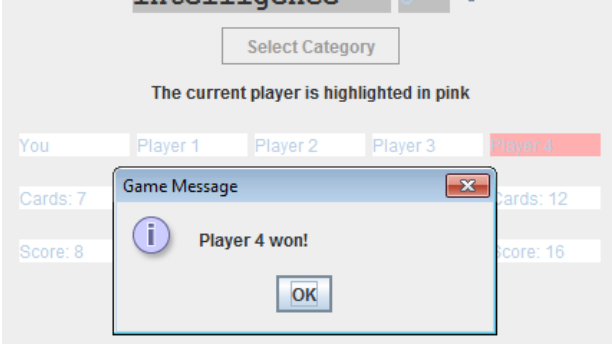


12

Example 1: (Select Category button disabled)



Example 2: (Select Category button disabled)



Example 3: (Select Category button disabled)



13

Example 1: (top row buttons disenabled)

New Game View Game Stats Save Stats to File

Select number of Players: 3 players

TRex

height	6	<input type="radio"/>
weight	6	<input type="radio"/>
length	12	<input type="radio"/>
ferocity	9	<input type="radio"/>
intelligence	9	<input type="radio"/>

Select Category

The current player is highlighted in pink

You Player 1 Player 2

Example 2: (top row buttons disenabled)

New Game View Game Stats Save Stats to File

Select number of Players: 5 players

Velociraptor

height	3	<input type="radio"/>
weight	5	<input type="radio"/>
length	5	<input type="radio"/>
ferocity	12	<input type="radio"/>
intelligence	10	<input type="radio"/>

Select Category

The current player is highlighted in pink

You Player 1 Player 2 Player 3 Player 4

14

Example 1: (Card count 6)

Player 3 won!

OK

The current

You Player 1 Player 2 Player 3

Cards: 0	Cards: 23	Cards: 11	Cards: 6
----------	-----------	-----------	----------

Score: 0	Score: 42	Score: 15	Score: 47
----------	-----------	-----------	-----------

Example 1: (Expected card count 8)

You	Player 1	Player 2	Player 3	
Cards: 0	Cards: 22	Cards: 10	Cards: 8	
Score: 0	Score: 35	Score: 49	Score: 48	

Example 2: (Card count 12)

ferocity				
intell				
The cur				
You	Player 1	Player 2	Player 3	
Cards: 0	Cards: 21	Cards: 12	Cards: 7	
Score: 0	Score: 8	Score: 46	Score: 37	

Example 2: (Expected card count 14)

ferocity				
intell				
The curre				
You	Player 1	Player 2	Player 3	
Cards: 0	Cards: 20	Cards: 14	Cards: 6	
Score: 0	Score: 3	Score: 8	Score: 4	

15

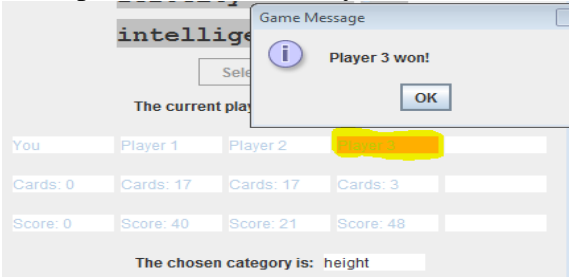
Example 1: (Winner is Player 2)

feroc				
intell				
The current player is highlighted in pink				
You	Player 1	Player 2	Player 3	
Cards: 0	Cards: 21	Cards: 15	Cards: 4	
Score: 0	Score: 11	Score: 37	Score: 2	

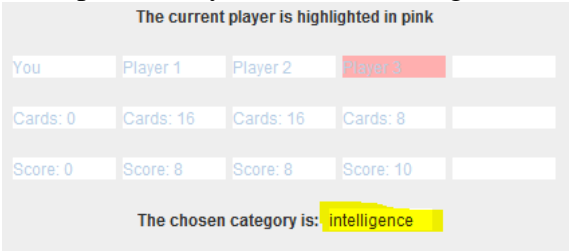
Example 1: (Player 2 selects intelligence as next choice)

You	Player 1	Player 2	Player 3	
Cards: 0	Cards: 20	Cards: 17	Cards: 3	
Score: 0	Score: 11	Score: 10	Score: 42	
The chosen category is: intelligence				

Example 2: (Winner is Player 3)



Example 3: (Player 3 selects intelligence as next choice)

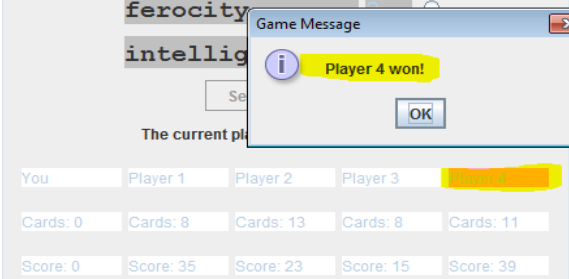


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Example 1: (Player 3 won)

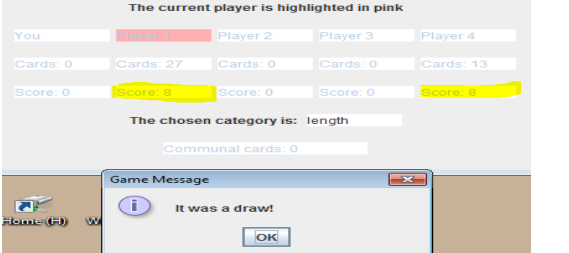


Example 2: (Player 4)



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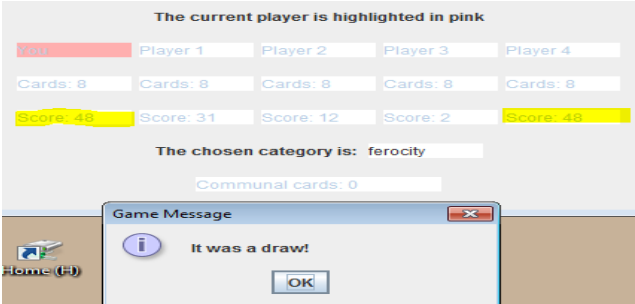
Example 1: (Draw between Players 1 and 4)



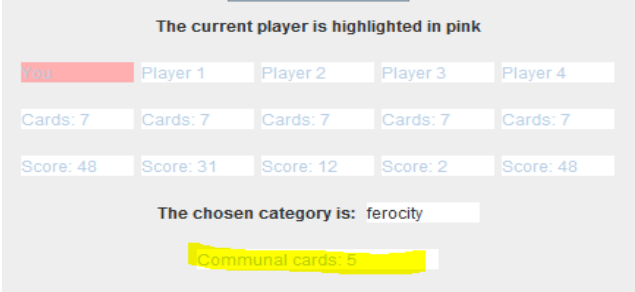
Example 1: (Expected in communal pile 2 cards)



Example 2: (Draw between User and Player 4)

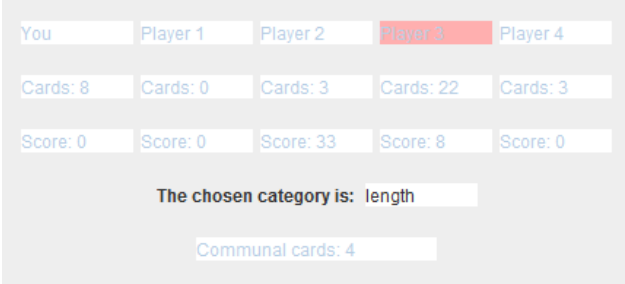


Example 2: (Expected in communal pile 5 cards)



18

Example 1:
(it was a draw and player 2 won)



(expect communal pile to clear, player 2's deck to increase by 5 cards, and other player in round to lose a further card)

You	Player 1	Player 2	Player 3	Player 4
Cards: 8	Cards: 0	Cards: 8	Cards: 21	Cards: 3
Score: 0	Score: 0	Score: 37	Score: 45	Score: 0
The chosen category is: ferocity				
Communal cards: 0				

Example 2:
(it was a draw and player 1 won)

You	Player 1	Player 2	Player 3	Player 4
Cards: 0	Cards: 10	Cards: 16	Cards: 11	Cards: 0
Score: 0	Score: 10	Score: 0	Score: 9	Score: 0
The chosen category is: height				
Communal cards: 3				

(expect communal cards to clear, player 1 to gain 4 cards, another player lose a further card)

You	Player 1	Player 2	Player 3	Player 4
Cards: 0	Cards: 14	Cards: 16	Cards: 10	Cards: 0
Score: 0	Score: 37	Score: 0	Score: 2	Score: 0
The chosen category is: ferocity				
Communal cards: 0				

19 (multiple consecutive draws)

(first draw)

You	Player 1	Player 2	Player 3	Player 4
Cards: 6	Cards: 6	Cards: 6	Cards: 11	Cards: 6
Score: 0	Score: 0	Score: 20	Score: 10	Score: 20
The chosen category is: sparkle				
Communal cards: 5				

(second draw)

You	Player 1	Player 2	Player 3	Player 4
Cards: 5	Cards: 5	Cards: 5	Cards: 10	Cards: 5
Score: 0	Score: 0	Score: 30	Score: 0	Score: 30
The chosen category is: sparkle				
Communal cards: 10				

(player 4 wins)

You	Player 1	Player 2	Player 3	Player 4
Cards: 4	Cards: 4	Cards: 4	Cards: 9	Cards: 4
Score: 0	Score: 0	Score: 20	Score: 0	Score: 30
The chosen category is: sparkle				
Communal cards: 15				

(player 4 gets all the communal cards + the opponent's card)

You	Player 1	Player 2	Player 3	Player 4
Cards: 4	Cards: 4	Cards: 3	Cards: 9	Cards: 20
Score: 0	Score: 0	Score: 10	Score: 0	Score: 20
The chosen category is: sparkle				
Communal cards: 0				

20

Example 1: (Players 1 and 4 have no cards)

The current player is highlighted in pink				
You	Player 1	Player 2	Player 3	Player 4
Cards: 6	Cards: 26	Cards: 0	Cards: 8	Cards: 0
Score: 25	Score: 49	Score: 0	Score: 9	Score: 0
The chosen category is: intelligence				
Communal cards: 0				

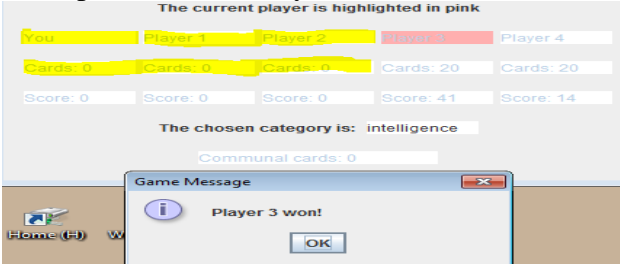
Game Message: Player 1 won!

Example 1: (Players 1 and 4 stay out of the game)

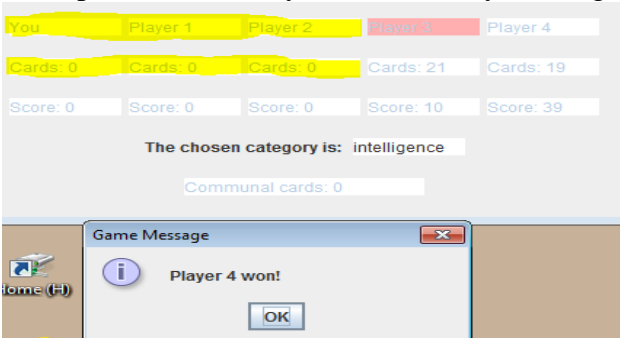
The current player is highlighted in pink				
You	Player 1	Player 2	Player 3	Player 4
Cards: 5	Cards: 28	Cards: 0	Cards: 7	Cards: 0
Score: 8	Score: 48	Score: 0	Score: 46	Score: 0
The chosen category is: length				
Communal cards: 0				

Game Message: Player 1 won!

Example 2: (User, Players 1 and 4 have no cards)

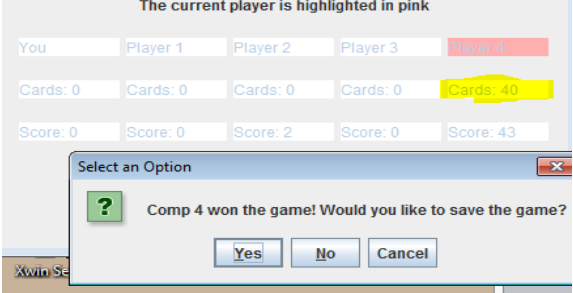


Example 2: (User, Players 1 and 4 stay out of game)

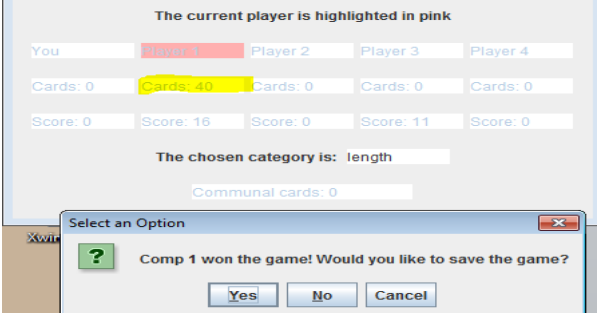


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Example 1: Player 4 is the winner with all the cards

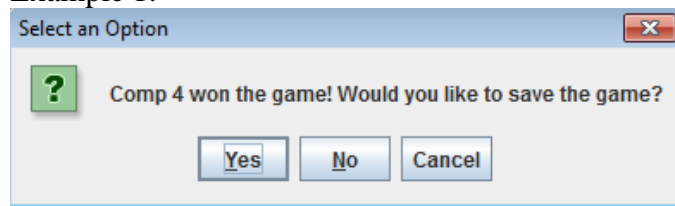


Example 2: Player 1 is the winner with all the cards

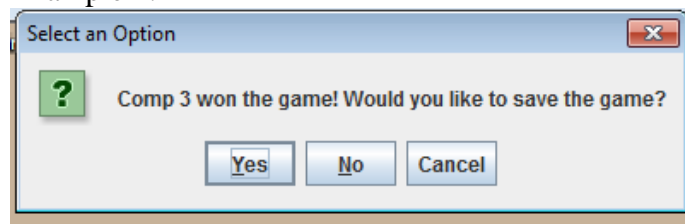


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Example 1:



Example 2:



23

Example 1: (Game stats)

Games	Computer Wins	Human Wins	Average Draws	Largest Number of Rounds
77	76	1	3.10	510

Example 1: (Correlating information in database)

74	74	Comp2	0.00	59
75	75	Comp1	4.00	189
76	76	Comp2	2.00	79
77	77	Comp4	3.00	115

Example 2: (Game stats)

Games	Computer Wins	Human Wins	Average Draws	Largest Number of Rounds
79	78	1	3.09	510

Example 2: (Correlating information in database)

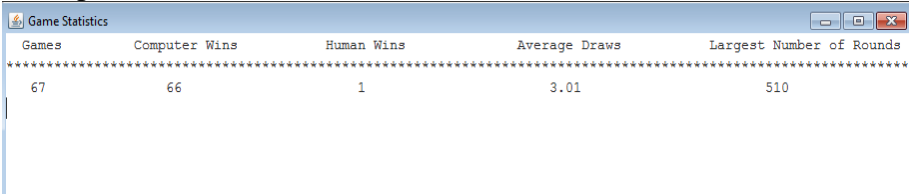
75	75	Comp1	4.00	189
76	76	Comp2	2.00	79
77	77	Comp4	3.00	115
78	78	Comp2	2.00	174
79	79	Comp2	3.00	28

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Example 1:

Games	Computer Wins	Human Wins	Average Draws	Largest Number of Rounds
65	64	1	3.11	510

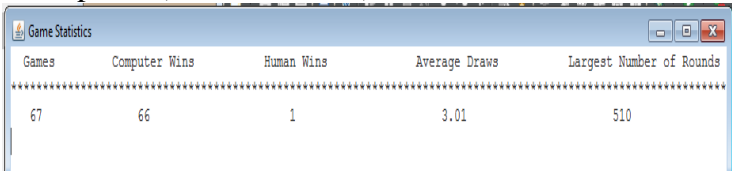
Example 2:



Games	Computer Wins	Human Wins	Average Draws	Largest Number of Rounds
67	66	1	3.01	510

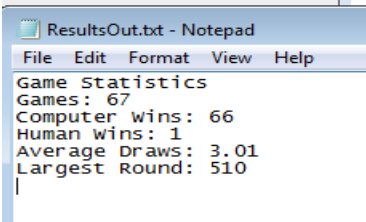
25

Example 1: (Game statistics)



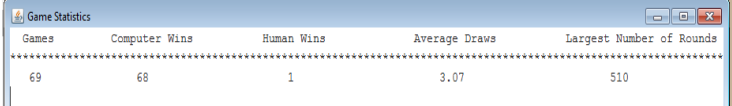
Games	Computer Wins	Human Wins	Average Draws	Largest Number of Rounds
67	66	1	3.01	510

Example 1: (Statistics results in text file)



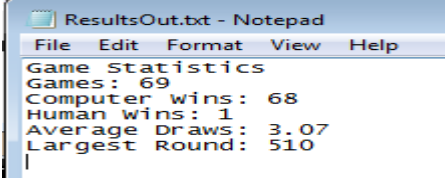
```
Game Statistics
Games: 67
Computer wins: 66
Human wins: 1
Average Draws: 3.01
Largest Round: 510
```

Example 2: (Game statistics)



Games	Computer Wins	Human Wins	Average Draws	Largest Number of Rounds
69	68	1	3.07	510


Example 2: (Statistics results in text file)



```
Game Statistics
Games: 69
Computer wins: 68
Human wins: 1
Average Draws: 3.07
Largest Round: 510
```

26

Example 1: (End of game)



The current player is highlighted in pink

You	Player 1	Player 2	Player 3	Player 4
Cards: 0	Cards: 0	Cards: 0	Cards: 40	Cards: 0
Score: 0	Score: 0	Score: 0	Score: 45	Score: 24

The chosen category is: ferocity

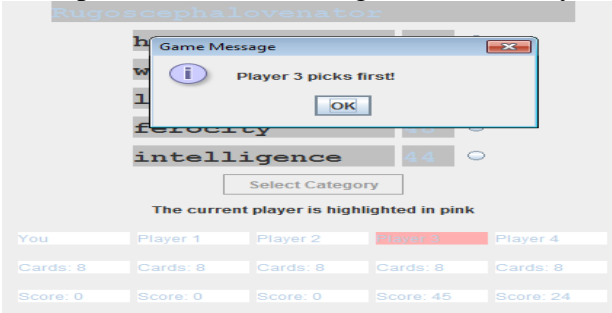
Communal cards: 0

File Output

Save results to file?

Yes No

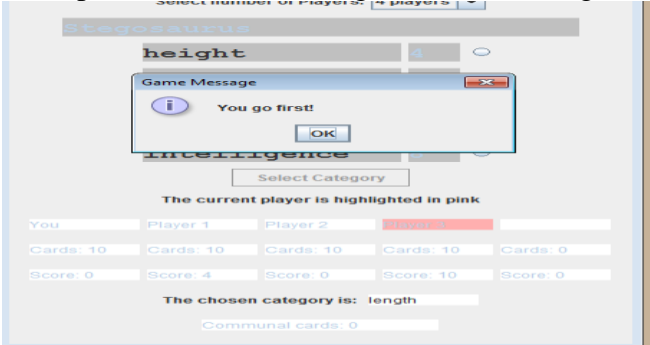
Example 1: (Start of a new game where Player 3 goes first)



Example 2: (End of game)



Example 2: (Start of a new game where user goes first)



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Example 1: (Game in play – cards in players hand)

```
***COMP 1'S DECK***
Styracosaurus 7 3 4 1 1
***COMP 2'S DECK***
Thescelochelomimus 39 5 6 28 24
Agilinychnus 28 40 5 48 10
Stegosaurus 4 3 8 1 8
Saurolophus 7 1 10 7 8
TRex 6 6 12 9 9
Brachiolodon 37 1 32 15 41
Archaeosaurus 40 20 9 33 14
Carnotaurus 5 6 7 9 8
```


Example 1: (End of game)

```
-----
THE WINNER OF THE GAME IS: PLAYER 2
Number of games: 82
Number of games: 82
Number of games: 83
Number of games: 83
Avg from Database: 3.04
Avg rounded: 3.04
Number of games: 83
Avg from Database: 3.04
Avg rounded: 3.04
```

Example 2: (Cards in players hand)

```
***COMP 3'S DECK***

Plateocercodromeus 15 4 46 16 24
Aepydonbator 25 20 37 34 49
Tyrannovenator 26 10 38 9 39
Parasaurolophus 7 7 1 3 4
Nanorhinogryphus 5 20 35 37 10
Agilinychus 28 40 5 48 10
Chlorodon 10 37 18 11 32
Therizinopodogryphus 19 36 1 31 47
Oviraptor 8 7 4 3 2
```

Example 2: (End of game)

```
-----
THE WINNER OF THE GAME IS: PLAYER 3
Number of games: 83
Number of games: 83
Number of games: 84
Number of games: 84
Avg from Database: 3.08
Avg rounded: 3.08
```

28

Example 1: (Table of games)

Output pane				
	game_no	winner	draw	no_rounds
	integer	character varying(20)	numeric(10,2)	integer
1	1	Human	2.00	152
2	2	Comp1	1.00	84
3	3	Comp1	0.00	54
4	4	Comp4	1.00	45
5	5	Comp2	1.00	66
6	6	Comp1	11.00	342
7	7	Comp3	0.00	86
8	8	Comp1	1.00	179
9	9	Comp2	1.00	89
10	10	Comp2	5.00	123
11	11	Comp2	2.00	108
12	12	Comp2	2.00	123
13	13	Comp1	7.00	347
14	14	Comp1	5.00	106

Example 2: (Table of games)

Output pane				
Data	Output	Explain	Messages	History
	game_no integer	winner character varying(20)	draw numeric(10,2)	no_rounds integer
54	54	Comp4	2.00	81
55	55	Comp4	1.00	68
56	56	Comp3	5.00	208
57	57	Comp4	4.00	69
58	58	Comp1	2.00	42
59	59	Comp1	15.00	495
60	60	Comp2	1.00	66
61	61	Comp4	8.00	369
62	62	Comp4	14.00	510
63	63	Comp2	2.00	114
64	64	Comp3	3.00	207
65	65	Comp2	1.00	112
66	66	Comp2	0.00	204
67	67	Comp2	0.00	21
68	68	Comp1	1.00	95
69	69	Comp4	9.00	235
70	70	Comp3	10.00	293
71	71	Comp2	0.00	16
72	72	Comp3	6.00	260
73	73	Comp3	2.00	76
74	74	Comp2	0.00	59
75	75	Comp1	4.00	189
76	76	Comp2	2.00	79
77	77	Comp4	3.00	115

Example 3: Table of Rounds won

Output pane						
Data	Output	Explain	Messages	History		
	gameno integer	human integer	comp1 integer	comp2 integer	comp3 integer	comp4 integer
1	1	74	0	54	3	0
2	2	20	40	0	0	0
3	3	3	34	0	0	0
4	4	12	6	0	0	0
5	5	5	20	0	0	0
6	6	3	172	156	0	0
7	7	7	8	2	43	26
8	8	2	96	76	4	0
9	9	4	33	51	0	0
10	10	2	0	66	5	45
11	11	10	8	52	1	35
12	12	7	0	65	0	49

Example 4: Table of Rounds won

Output pane						
Data	Output	Explain	Messages	History		
	gameno integer	human integer	comp1 integer	comp2 integer	comp3 integer	comp4 integer
50	50	0	73	53	0	0
51	51	8	67	0	1	54
52	52	9	153	4	1	134
53	53	14	0	5	2	27
54	54	0	1	0	29	49
55	55	6	0	21	0	36
56	56	0	4	87	109	3
57	57	7	0	5	20	33
58	58	0	22	10	8	0
59	59	23	239	218	0	0
60	60	22	0	41	0	2
61	61	0	2	21	161	177
62	62	0	234	4	2	256
63	63	9	0	59	2	42
64	64	0	4	0	111	89
65	65	43	4	62	2	0
66	66	6	87	111	0	0
67	67	1	3	17	0	0
68	68	1	55	1	37	0
69	69	2	101	0	1	122
70	70	1	16	2	142	122
71	71	1	0	13	2	0
72	72	3	5	115	131	0
73	73	15	22	0	37	0
74	74	20	0	36	3	0
75	75	4	102	78	1	0
76	76	0	31	46	0	0
77	77	4	40	0	12	56

* The draw test pack has cards with lots of equal values to ensure frequent draws occur.