

Versions History

Date	Description of Changes
8 Feb	<ul style="list-style-type: none"> ■ Under appendix A #2, corrected a typo. Removed this sentence “ and player can’t put more points to Gunnery”.
7 Feb	<ul style="list-style-type: none"> ■ Under appendix A #1, Clarified that he needs to buy his own ship, parts and weapons after creating his character. ■ Under #11, and Appendix A, clarified that there will be a resource drop for each combat for the attacker.
5 Feb	<ul style="list-style-type: none"> ■ Under #5, Original: “The HP could be decreased during exploration or when attacked by other player (PVP).” Replace with: “The HP could be decreased when attacked by other player (PVP).” ■ Under #11, clarified that sinking XP is on top of combat XP. Original: “Sinking XP and gold are rewarded to the attacker / defender who manage to sink the opponent.” Replace with: “Sinking XP and gold are rewarded on top of combat XP if the attacker/defender manages to sink the opponent.”
1 Feb	<ul style="list-style-type: none"> ■ “Submission is optional.” under Professionalism ■ added link to download data file

Project: BattleStations

Expected Effort (approx):	40 hours per person
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Suggested Milestones

The project scenario will be used in the quizzes and lab tests. You will need to work on it to do well in the assessments. The following milestones are suggested:

Milestone 1: Week 6

1. One use case diagram for the whole application (1 – 2 lines to describe each use case)
2. One domain diagram for the whole application
3. A working application, with login and register functionality.

Milestone 2: Week 8

1. A working application with login, register, and Go Shopping (#4 of main menu).
2. A class diagram of all the classes identified so far. There is no need for attributes and methods.
3. For “View my Hanger” use case, produce the following design artifacts:
 - a. Use case scenarios
 - b. draw the sequence diagrams

Milestone 3: Week 12

4. A working application.
5. A complete class diagram. There is no need for attributes and methods.
6. For “GO Shopping” use case:
 - a. Use case scenarios
 - b. draw the sequence diagrams

Professionalism

- All submission is to be done using eLearn dropbox. Submission is optional.
- The zip file should contain the following folders and files:
 - A *<email id>.pdf* containing all the analysis and design, and project management artifacts. You should **NOT** submit multiple files (and multiple file formats).
 - Include page number and an accurate table of content
 - Use decent margin and readable font sizes of at least 10-11 points
 - Visible diagrams and practice good diagramming guidelines (<http://www.agilemodeling.com/style/general.htm>)
 - A *compile.bat* that compiles all your java source files and place them in the **classes** directory. A *run.bat* that runs your application.

Note: Your batch files can assume that javac.exe and java.exe are found in the PATH environment variable.

- **src**
This directory contains all your java source files.
- **classes**
This directory is left empty during submission.
- **data**
This directory contains your CSV files of your application.
- **lib (Only if using any external libraries)**
This directory contains any jar files that you use for your application.

This project is based loosely on the facebook game, BattleStations, developed by Tyler. In BattleStations, you are the captain of your own airship and you aim to be the most powerful battleship in the country of Sios!

It does not need to look like or have the same functionalities as the real system. Below are the functional requirements:

1. Character Type

- To play the game, a player starts by choosing a character type.
- There are two character types. Each character type will place some restriction on the allocation of the stats points (Refer to Point 2).

Character Type	Description	Stat points Allocation / level
Pirate	Pirates care little for trading or exploring. Instead, they excel at attacking and looting other player's ships. The pirate gets a bonus to attack power and gets extra gold for each attack on an enemy ship.	<ul style="list-style-type: none">● 1.5 Gunnery● 3 free stat points
Explorer	The explorer specializes at discovering new lands and trade routes. Being navigation experts, the Explorers get a bonus to their speed. They also have a higher chance to find rare items and resources during PVP.	<ul style="list-style-type: none">● 1.5 Navigation● 3 free stat points

2. Statistics(stats) Points

- There are three basic character statistics that are increased every time you level up.
- Depending on your character type, certain points are automatically allocated while some are manually added to your statistics. For example, Pirate will have 1.5 Gunnery. Player can allocate his 3 free points to the other statistics (including gunnery) depending on how he wishes to build his character.
- Both character types (pirate and explorer) gain 4.5 stat points per level.
- Below are the effects of each point allocation:
 - a. Gunnery
 - Increases the damage of main cannons, sub cannons and missiles by 0.5% per

point.

b. Craft

- Increases the ship's HP (Health Point) by 1% per point.

c. Navigation

- Increases ship's speed by 1 per point.
- Increases the damage of melee weapons by 0.5% per point.
- Increases the damage of missiles by 0.25% per point.

3.

Resources

- Gold is the basic currency in the Country of Sios.
- Wood, Ore and plasma rock are resources required for the purchase of ships, weapons and parts.
- Both can be obtained by attacking other players.

4. Ship

- Each player can only own one ship at a time.
- Weapons and parts can be equipped on the ship.
- The model of the ship bought determines the number of weapon slots available.
- Each player can equip a weapon for each slot. There is no restriction on the weapon type (cannon, sub-cannon, missile or melee) to be equipped on each slot.
- Each ship has a carrying capacity. The total weight of the weapons and parts cannot exceed the carrying capacity.

5. Health Point (HP)

- A ship has HP and is amplified by the craft stats point.
- The HP could be decreased when attacked by other player (PVP).
- The player can use Action Point (AP) (described in a later section) to repair the ship. The HP recovered per AP spent is (full HP)/10. E.g. if a ship's full HP is 20, 1 AP can recover 2 HP.
- A ship is considered sunk once it has 0 HP. You need 10 AP to salvage a sunken ship (to restore it to full HP).
- Once a ship is sunk, the player cannot attack other players. The player can't be attacked either.

6. Weapons

- Weapons vary according to their damage points, weight and range.
- There are 4 weapon types, namely main cannons, sub-cannons, missiles and melee weapon.

- The main cannons offer a good balance of damage, range and weight. Each point of Gunnery (Character Statistics) increases the damage by 0.5%
- The sub-cannons deal slightly more damage but with greatly reduced range and weight. They are useful when your ship is short on capacity. Each point of Gunnery increases the damage by 0.5%.
- The missiles deal lower damage than cannons, but with vastly increased range. It is useful to sink fast-moving targets and to defend at high speed. Each point of Gunnery increases the damage by 0.5%. Each point of Navigation increases the damage by 0.25%.
- The melee weapons deal massive damage during close combats. As they are heavy, they are only useful if you have a high capacity ship. Each point of navigation increases the damage by 0.5%.
- To purchase a weapon, the player will need the required gold and resources (specified in the data files).

7. Ship Parts

- An airship can be equipped with a figurehead, a sail, a stabilizer, a hull and an engine.
- Each part affects the ship statistics in different ways. Refer to the data files on the impact.

Weapon Part	Speed	HP	Capacity
Figurehead	+ / -	+	N.A.
Sail	+	N.A.	N.A.
Stabilizer	+ / -	N.A.	N.A.
Hull	+ / -	+	+
Engine	+	N.A.	N.A.

8. Port

- The Imperial City Port is the only port in the country of Sios.
- The port has three shops. Items offered in each shop are listed in the various CSV files given.

Shop	Item Sold
Shipyards	Selling ships
Armory	Selling weapons
Part	Selling ship's parts

9. Action Point (AP)

- Action points are required to attack other players. The action of attacking other player is usually termed as PVP (Player versus Player).
- The player gets 120 AP when he logs in the first time each day
- The maximum number of APs that can be stored is 500.

10. XP (Experience Points)

- The player's progress is measured via levels. The leveling system is based on experience points. Gaining each level requires a certain amount of experience.
- With each level, the player receives 3 stat points to manually allocate.
- Experience is accumulated through PVP
- The level is determined as follows:

Level	XP
1	0
2	100
3	300
4	700
5	1,400
6	2,500
7	4,100
8	6,300
9	9,200
10	12,900

- The maximum level the player can reach is 100.

11. PVP (Player versus Player)

- In the game, a player (attacker) can choose to attack another player (defender) that is within 5 levels of the player.
- PVP will cost 8 AP.
- The attacker is placed at the 0m mark. The defender is placed at the 1000m mark. Both will start moving at their respective speed. The flow of combat is as follows:
 1. When the defender crosses 2500m mark, the attacker's weapons will fire (if any of them is in range), followed by the defender's (if any of them is in range).
 2. Repeat step 1 when the defender crosses the 5000m mark (If both are not sunk).
 3. Repeat step 1 when the defender crosses the 7500m mark (If both are not sunk).

- Assume that the attacker will never overtake the defender (for simplicity's sake). The attacker will always maintain a minimum distance of 50m behind the defender.
- An example combat(at 2500m) is as follows:

Attacker's weapons

Weapon	Range	Min damage	Max Damage
Fireflash Bombs	3800 m	500	1500
Volcano Cannon	900 m	900	1300
Spike Buster	650 m	1400	1800

Defender's weapons

Weapon	Range	Min damage	Max Damage
Power Claw	50 m	3000	3500

Assume that the attacker is moving at 55 m/s and the defender is moving at 85 m/s.

The defender will require $\left\lceil \frac{2500 - 1000}{85} \right\rceil = 18$ s to cross the 2500 m.
 Defender's distance (from starting point) = $18 \times 85 + 1000 = 2530$ m
 Attacker's distance (from starting point) = $18 \times 55 + 0 = 990$ m
 Distance apart = $2530 - 990 = 1540$ m

For the attacker, only the Fireflash Bombs weapon is within firing range. For the defender, only the Valkyrie Lance is within firing range.

- To generate the damage dealt to the opponent,
 1. Find out the damage interval (Max damage – Min damage). For example, the damage interval for Fireflash Bombs is $1500 - 500 = 1000$.
 2. Generate a random number (R) within the damage interval, which will be the damage dealt
 $500 + (\text{int})(\text{Math.random}() * 1000)$
- After each battle, the attacker and the defender will be rewarded with combat XP and gold. The combat XP and gold is determined by the amount of damage dealt to the opponent.
- Sinking XP and gold are rewarded on top of combat XP if the attacker/defender manages to sink the opponent.
- To calculate the combat and sinking XP is as follow:

Combat XP = (Total Damage given to the opponent / 300) * level * 5 * Multiplier

Sinking XP = 1.5 * Combat XP

Level Difference	Attacker's Multiplier	Defender's Multiplier
-5	1.3	0.7
-4	1.2	0.8
-3	1.1	0.9
-2	1.0	1.0
-1	1.0	1.0
0	1.0	1.0
1	1.0	1.0
2	1.0	1.0
3	0.9	1.1
4	0.8	1.2
5	0.7	1.3

- To calculate of the combat and sinking Gold is as follow:

Combat Gold = (Total Damage given to the opponent / 300) * Multiplier * level

Sinking Gold = 1.5 * Combat Gold

- The total gold and XP awarded are the sum of the combat and sinking gold and XP respectively.
- There will be a resource drop of 0 - 5 prock, 0 - 5 ore, 0 - 5 wood for each combat regardless of win/lose for the attacker. Use random generator to decide on the exact number of resource to drop.

12. Data files

- The following data files are provided from blue.smu.edu.sg/ooad/data.zip.

Description	Data File
Ship	ships.csv
Weapon – cannons	cannons.csv
Weapon – sub-cannons	subcannons.csv
Weapon – missiles	missiles.csv

Weapon – melee	melee.csv
Part – figurehead	figurehead.csv
Part – engine	engine.csv
Part – hull	hulls.csv
Part – sail	sails.csv
Part – stabilizer	stabilizers.csv

- A comma separated values (CSV) file is a computer data file used for the storage of data structured in a table form. They are text files and can be opened using your text editor. For easy editing, use MS excel.

Appendix A: Sample Run of the application

1. Login

- The application starts by showing the player the welcome page.

```
== BattleStations :: Welcome ==
Good morning, player!
1. Login
2. Register
Enter your choice > 1
```

- If the user enters 1, the application prompts the player for the username and password.

```
Enter your username > yllee
Enter your password > pa55w0rd
```

Note: If you wish to mask your password, you can read up on the Console class (<http://docs.oracle.com/javase/7/docs/api/java/io/Console.html>)

- The application displays an error if the username or password is entered incorrectly.
- Upon successful registration, the player will be allocated 5000 gold, 500 wood, 50 ore and 5 plasma rocks. He needs to buy his ship, parts and weapons before he can PVP.

2. Registration

- If the user enters 2, the application prompts the player to register:

```
== BattleStations :: Registration ==
Enter your username > SureWunSink
Enter your password > pa55w0rd
Confirm your password > pa55w0rd
Pirate (P) / (E)xplorer > P
Account successful created
```

3. Main Menu

- The player sees the following menu when he logs in.

```
== BattleStations :: Main Menu ==
Captain: SureWunSink [L50]
AP: 120                                HP: 16310 / 16310
Gold: 4,888,888                        Wood: 38
Ore: 25                                Prock: 8
1. View my vital statistics
2. My hangar
3. Le Shippe Shoppe
4. PVP
5. Exit
```


4. View my vital statistics

- The vital statistics are displayed to the user.
- If the player levels up, this is the screen where they allocate their free stat points.

```
== BattleStations :: captain ==
Craft: 77
Gunnery: 141          Speed: 60(+3)
Navigation: 3         Stats Pts: 3
Wins: 135             Losses: 17
Total Exp: 12,800
Joined on: 25 Sep 2013
[R]eturn to main | [A]llocate Stats Pts>
```

- For the speed field, 60 is the final speed. +3 is the speed contribution from the navigation stats point.
- If the user presses R, he will return to the Main Menu.
- If the user presses A, he will be prompted on his stats distribution.

```
== BattleStations :: Stats Allocation ==
Gunnery (+) > 1
Craft (+) > 1
Navigation (+) > 1
[R]eturn to main >
```

5. My Hangar

- The hangar will state the condition of the ship and allows the player to salvage the ship.
- It also allows the player to equip parts and weapons.

```
== BattleStations :: Hangar ==
Your ship has been sunk. You need 10 AP to salvage.
```

```
Parts:
[F]igurehead:      L45 - Black Skull crest
[S]ail:            L45 - Solar Sail
S[t]abilizer:      L48 - Outrigger
[H]ull:            L40 - Alloy Plating
[E]ngine:          L40 - Fuel Injector
```

```
Weapons:
[W1] L40 - Impact Cannon
[W2] L40 - Impact Cannon
[W3] L35 - Aerial Mines
[W4] L45 - Hand of Justice
```

Capacity: 2145 / 3625
 Speed: 333
 HP: 15910 / 15910
 [R]eturn to main | [E]quip | [U]nequip | [R]epair >

- If the player selects U, the application prompts him to enter the part/weapon to be unequipped

[R]eturn to main | Enter weapon/part to be unequipped > W1

- If the player selects E, the application prompts him to enter the part/weapon to be equipped

```
== BattleStations :: Storage ==
Figureheads:
[F1] L50 - El Toro Crest
```

```
Sails:
NIL
```

```
Stabilizer
NIL
```

```
Hull:
[H1] L30 - Timing Value
```

```
Engine:
NIL
```

```
Weapons:
[W1] L40 - Impact Cannon
[W2] L40 - Impact Cannon
```

[R]eturn to main | Enter weapon/part > W1

- If the player selects R, he can choose to repair by gold (1 Gold for 1 HP) or AP:

```
== BattleStations :: Storage ==
Gold available: 90,000
AP: 100
```

```
Status: 14910/15910
Repair (Max)
[A]P: 1
[G]old: 1000
```

[R]eturn to main | Enter number of AP/Gold > 1A

6. Le Shippe Shoppe

- This is the place where the player buys his ship, weapon or parts.

Shipyard	Selling ships
Armory	Selling weapons
Part	Selling ship's parts

```
== BattleStations :: Le Shippe Shoppe ==
1. Le Shipyard
2. Le Armory
3. Le Part
```

```
[R]eturn to main | Enter weapon/part > 1
```

- The relevant shop will be displayed base on the player's input

```
== BattleStations :: Le Shipyard ==
1. Windrider (min: L1)
2. Albatross (min: L10)
3. Enterprise (min: L10)
4. Manta (min: L15)
5. Aegis (min: L25)
6. Vanguard (min: L30)
7. Hammerhead (min: L30)
8. Merchant O' War (min: L30)
9. Cargo Dirigible (min: L45)
10. Obsidian Destroyer (min: L45)
11. Battle Royale (min: L50)
12. Trident (min: L50)
13. Endeavor (min: L70)
14. Ballista (min: L75)
15. Goliath (min: L75)
16. Katana (min: L75)
[R]eturn to main | Enter number > 16
```

- Once the player selects a shop, the details are displayed

```
== BattleStations :: Le Shipyard :: Details ==
Ship: Katana

Speed: 145
HP: 17500
Slots: 7
Capacity: 10250
Level Required: 75

Gold: 3,125,000 | Wood: 700 | Ore: 460 | Prock: 23

[R]eturn to main | [B]uy it >
```


7. PVP

```

== BattleStations :: PVP ==
1. cMonMissILE Me [95] - Damaged
2. Retired [97] - Perfect
3. Dragon of Fury [98] - Damaged
[R]eturn to main | Attack (1-3) > 1

SureWunSink's HP: 15910 / 15910
cMonMissILE HP: 15910/ 15910
SureWunSink attacks with Impact Cannon at 1240 m (1010 damage)
SureWunSink attacks with Impact Cannon at 1240 m (1022 damage)
SureWunSink attacks with Impact Cannon at 1240 m (952 damage)
SureWunSink attacks with Impact Cannon at 1240 m (1088 damage)
cMonMissILE Me attacks with Aerial Mines at 2635 m (95 damage)
cMonMissILE Me attacks with Impact Cannon at 2635 m (1200 damage)
cMonMissILE Me attacks with Impact Cannon at 2635 m (1196 damage)
cMonMissILE Me attacks with Hand of Justice at 2635 m (1100 damage)

cMonMissILE Me's HP: 11838 / 15910
SureWunSink's HP: 12319/ 15910
SureWunSink attacks with Impact Cannon at 3968 m (1002 damage)
SureWunSink attacks with Impact Cannon at 3968 m (1022 damage)
SureWunSink attacks with Impact Cannon at 3968 m (935 damage)
SureWunSink attacks with Impact Cannon at 3968 m (888 damage)
cMonMissILE Me attacks with Aerial Mines at 5232 m (435 damage)
cMonMissILE Me attacks with Impact Cannon at 5232 m (1055 damage)
cMonMissILE Me attacks with Impact Cannon at 5232 m (895 damage)
cMonMissILE Me attacks with Hand of Justice at 5232 m (891 damage)

cMonMissILE Me's HP: 7991 / 15910
SureWunSink's HP: 9043/ 15910
SureWunSink attacks with Impact Cannon at 5704 m (965 damage)
SureWunSink attacks with Impact Cannon at 5704 m (901 damage)
SureWunSink attacks with Impact Cannon at 5704 m (1015 damage)
SureWunSink attacks with Impact Cannon at 5704 m (1168 damage)
cMonMissILE Me attacks with Aerial Mines at 7521 m (1035 damage)
cMonMissILE Me attacks with Impact Cannon at 7521 m (1155 damage)
cMonMissILE Me attacks with Impact Cannon at 7521 m (895 damage)
cMonMissILE Me attacks with Hand of Justice at 7521 m (1009 damage)

It is a draw!
SureWunSink's HP: 3942 / 15910
cMonMissILE Me's HP: 4949 / 15910
cMonMissILE Me gained 2000 gold
SureWunSink gained 1850 gold.
cMonMissILE Me gained 1000 exp.
SureWunSink gained 9250 exp.

SureWunSink get 4 procks, 2 ores, 1 wood.

```

Note: The distances and damages shown above are for illustration purpose. They might not be accurate.

8. Exit

- The user can choose to exit at any point in time during the execution of the program through the main menu.