

# [Project #3] Battleship

- Battleship game
  - 10 X 10 squares in the grid (Sea)
  - Each player secretly places own ships
  - Players bomb a target coordinate in turn
    - Opponent player tells “hit” or “miss”
    - When hit, opponent also tells the type of ship
- Battleships table

Type of Ship	Size	#Ships
Aircraft Carrier	6	1
Battleship	4	2
Submarine	3	2
Destroyer	3	1
Patrol Boat	2	4

# Computer's Board

- Computer positions ships and you bomb them with a given number of bombs
- Randomly initialize battleships on board
  - Coordinates are A-J and 1-10.
  - Use the size and the quantity of ships in “Battleships table”.
  - Secretly place ships either horizontally or vertically without overlaps

# Computer's Board

- Pseudo code with random

```
loop(for each ship in range from 'Aircraft Carrier' to 'Patrol Boat') {  
  var x = random in range [A..J]  
  var y = random in range [1..10]  
  var vh = random in range [0..1] // 0 = vertical 1 = horizontal  
  
  if (isOverlap(x, y, vh) == false)  
    Position the ship  
    next loop  
  else  
    loop again  
}
```

# Bombing Battleships

- Player sets bombing targets and computer tells “hit” or “miss”
  - Mark the bombs with ‘X’
    - Mark a hit with ‘X’ specify the type of ship
    - E.g., Xp – hit on **P**atrol Boat, Xa – hit on **A**ircraft Carrier
- Player will be given  $N$  bombs
- Player inputs the target coordinates  $N$  times interactively, reviewing the results (hit or miss)
- Show the score at the end of the program
  - Score =  $\sum$ (the size of ship for each hit)

# Display the Board

	A	B	C	D	E	F	G	H	I	J
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

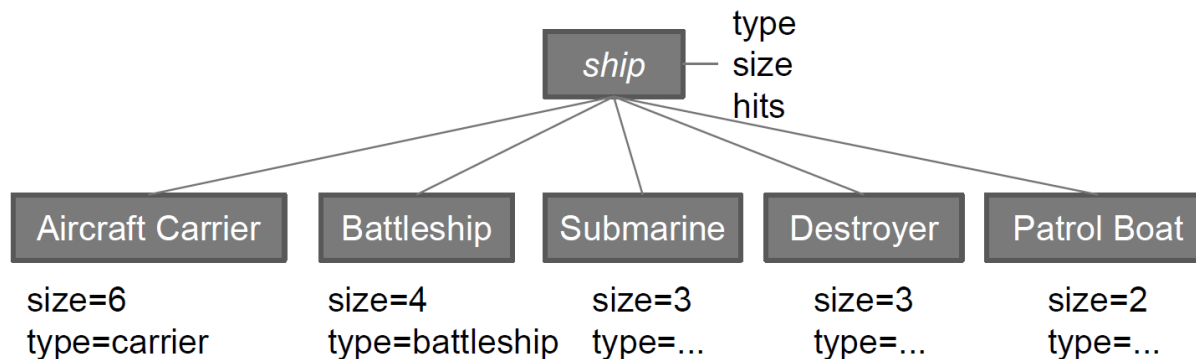
	A	B	C	D	E	F	G	H	I	J
1	P	P		S			B	B	B	B
2				S						
3	B			S		D	D	D		P
4	B									P
5	B									
6	B					P				S
7						P				S
8	P	P								S
9										
10						A	A	A	A	A

	A	B	C	D	E	F	G	H	I	J
1										
2										
3										
4			X							
5						X	X			
6		X						X		X
7				X						X
8	X	X						X		
9										
10										

	A	B	C	D	E	F	G	H	I	J
1	P	P		S			B	B	B	B
2				S						
3	B			S		D	D	D		P
4	B		X							P
5	B					X	X			
6	B	X				P		X		Xs
7				X		P				Xs
8	Xp	Xp						X		S
9										
10						A	A	A	A	A

# Data Structures

- Board (**Recommend**)
  - `std::map<char, std::vector<ship*>>` for a board
  - `std::vector<ship*>` for a column
- Ships defined with inheritance (**Necessary**)



# Program Flow

- Command Line Arguments
  - Random seed, The number of bombs, Program mode
  - Program mode: 'd' for debug mode, 'r' for release mode
  - E.g., 100 10 d
- Debug mode
  - Display board for every step
- Release mode
  - Display review only
  - Display the board at the end

==== Game Start =====

	A	B	C	D	E	F	G	H	I	J
	-	-	-	-	-	-	-	-	-	-
1	P	P		S			B	B	B	B
2				S						
3	B			S		D	D	D		P
4	B									P
5	B									
6	B					P				S
7						P				S
8	P	P								S
9										
10					A	A	A	A	A	A

**C4**  
miss

	A	B	C	D	E	F	G	H	I	J
	-	-	-	-	-	-	-	-	-	-
1	P	P		S			B	B	B	B
2				S						
3	B			S		D	D	D		P
4	B		X							P
5	B									
6	B					P				S
7						P				S
8	P	P								S
9										
10					A	A	A	A	A	A

==== Game Start =====

C4  
miss

A8  
hit on Patrol Boat

C4  
Try again

H8  
miss

	A	B	C	D	E	F	G	H	I	J
	-	-	-	-	-	-	-	-	-	-
1	P	P		S			B	B	B	B
2				S						
3	B			S		D	D	D		P
4	B		X							P
5	B					X	X			
6	B	X				P		X		Xs
7				X		P				Xs
8	Xp	Xp						X		S
9										
10					A	A	A	A	A	A

Score: 10

**A8**

hit on Patrol Boat

	A	B	C	D	E	F	G	H	I	J
	-	-	-	-	-	-	-	-	-	-
1		P	P		S			B	B	B
2					S					
3		B			S		D	D	D	
4		B		X						P
5		B								
6		B					P			S
7							P			S
8		Xp	P							S
9										
10						A	A	A	A	A

**C4**

Try again

	A	B	C	D	E	F	G	H	I	J
	-	-	-	-	-	-	-	-	-	-
1		P	P		S			B	B	B
2					S					
3		B			S		D	D	D	
4		B		X						P
5		B								
6		B					P			S
7							P			S
8		Xp	P							S
9										
10						A	A	A	A	A

**H8**

miss

	A	B	C	D	E	F	G	H	I	J
	-	-	-	-	-	-	-	-	-	-
1		P	P		S			B	B	B
2					S					
3		B			S		D	D	D	
4		B		X						P
5		B					X	X		
6		B	X				P		X	Xs
7					X		P			Xs
8		Xp	Xp					X		S
9										
10						A	A	A	A	A

Score: 10