

# C++ Advanced – Exam 1 (29 Feb 2020)

Write C++ code for solving the tasks on the following pages.

Code should compile under the C++11 standard.

Submit your solutions here <https://judge.softuni.bg/Contests/1805/>

Any code files that are part of the task are provided under the folder **Skeleton**.

Please follow the exact instructions on uploading the solutions for each task.

## Task 4 – Starcraft III

Your task is to write a program that represents an epic air battle from the famous computer game – “**Starcraft**”.

Two races have their large air armies ready to fight one another.

The Terran race(humans) will fight versus The Protoss race(space aliens).

You are provided with **header** files for all Terran and Protoss air ships. Your task is to **provide an implementation** for all different kinds of air ships.

The **Terran** air fleet consist of 2 ships:

Each Terran space ship has **health** indicator. When that indicator **reaches 0** – the air ship is **immediately destroyed**.

- **Viking** – a light human space ship.  
**Special abilities:** does **double damage** against enemy Protoss **Phoenix** space ships.
- **Battle Cruiser** – a heavy artillery human space ship.  
**Special abilities:** every 5<sup>th</sup> turn the Battle Cruiser performs a special attack “Yamato Cannon”, which is **5 times more powerful** than the normal attack. The “Yamato Cannon” attack substitutes the normal attack for that turn. Example:  
turns 1, 2, 3, 4 the Battle Cruiser performs normal attack and on turn 5 it uses “Yamato Cannon”.  
turns 6, 7, 8, 9 the Battle Cruiser performs normal attack and on turn 10 it uses “Yamato Cannon”.

The **Protoss** air fleet:

Each Protoss air ship has **health** and **shield** indicators.

When the Protoss air ship is damaged the **shield** is first consumed. After the shield value reaches **0** the health indicator is starting to be consumed.

When the **health** indicator **reaches 0** – the air ship is **immediately destroyed**.

After each turn the protoss air ships regain some portion of their shield back. Shield indicator can **Not** exceed it's maximum value.

Example: ship has 20 health and 50 shield.

- 1) ship takes 40 damage -> left with 20 health and 10 shield.
- 2) ship regenerates 20 shield -> left with 20 health and 30 shield.
- 3) ship takes 40 damage -> left with 10 health and 0 shield
- 4) ship takes regenerates 20 shield -> left with 10 health and 20 shield
- 5) ship takes 40 damage -> left with -10 health (ship is immediately destroyed)

The **Protoss** air fleet consist of 2 ships:

- **Phoenix** – a light alien space ship.  
**Special abilities:** regenerates 20 shield after it's turn is finished //call to its `::finishTurn()` method.  
NOTE: after shield regeneration the shield value can **Not** exceed the ship maximum shield value.
- **Carrier** – a heavy alien space ship that attacks with **N** small weapons (called Interceptors).  
**Special abilities:** The Carrier attacks **N** numbers of times on a single turn.  
**N** is 8 (the Carrier attacks with 8 Interceptors), when the Carrier **is at full health**. (Health, not shield)  
If the Carriers **health is not at its maximum value** – **N** is 4 (the Carrier attacks with only 4 Interceptors)

Regenerates 40 shield after it's turn is finished //call to its `::finishTurn()` method.

NOTE: after shield regeneration the shield value can **Not** exceed the ship maximum shield value.

Example:

Carrier has 150 health and 150 shield -> it attacks with 8 Interceptors

Carrier has 150 health and 50 shield -> it attacks with 8 Interceptors

Carrier has 149 health and 0 shield -> it attacks with 4 Interceptors

Carrier has 149 health and 150 shield -> it attacks with 4 Interceptors

You are given the `main()` function, which reads 2 strings (**terranFleetComposition** and **protossFleetComposition**).

**terranFleetComposition:** consists of the letters 'v' and 'b' (for **Viking** and **BattleCruser**).

**vvbb** -> would mean array of 4 air ships.

**Viking** with index 0, **Viking** with index 1, **BattleCruser** with index 2, **BattleCruser** with index 3

**protossFleetComposition:** consists of the letters 'p' and 'c' (for **Phoenix** and **Carrier**).

**pcpcp** -> would mean array of 5 air ships.

**Phoenix** with index 0, **Carrier** with index 1, **Phoenix** with index 2, **Carrier** with index 3, **Phoenix** with index 4

- The air fleets take turns attacking each other.
- First goes the Terran, then the Protoss, then Terran, then Protoss, etc ... until one of the fleets is destroyed.
- Every time when a fleet attacks the enemy fleet it **ALWAYS TARGETS THE LAST SHIP** (until that ship is dead).

When the ship is dead it should be **immediately removed from the air ship array** and then the **next last ship should be targeted**.

Example: Terran fleet is: **vvb**

The protoss army will attack only the **BattleCruser** with **Index 2** until that ship is dead. Once it is dead it should be **removed** from the terran air fleet array. The array is left with only 2 Viking ships.

Protoss will start to attack **Viking** with **index 1**.

- Keep in mind that the Carrier ship attacks multiple times per single turn. If the Carrier happens to kill an enemy ship and still has shots left (Interceptors that have not fired) they are used on the next ship(if such exists).
- In the perfect case scenario you should have 6 cpp files for your solution.  
TerranAirShip.cpp Viking.cpp BattleCruser.cpp ProtossAirShip.cpp Phoenix.cpp Carrier.cpp
- When a ship destroys an enemy ship you should **print** `*ShipName*` with ID: `*ShipId*` killed enemy airship with ID: `"enemyShipID"` (where `*ShipName*` is Viking, BattleCruser, Phoenix or Carrier)

## Restrictions

There are no other restrictions than the mentioned in the Judge limits.

## Examples

| Input    | Output  |
|----------|---|
| vv<br>pp | Last Protoss AirShip with ID: 1 has 90 health left<br>Last Terran AirShip with ID: 1 has 110 health left<br>Last Protoss AirShip with ID: 1 has 80 health left<br>Last Terran AirShip with ID: 1 has 70 health left<br>Last Protoss AirShip with ID: 1 has 40 health left<br>Last Terran AirShip with ID: 1 has 30 health left<br>Viking with ID: 1 killed enemy airship with ID: 1<br>Last Protoss AirShip with ID: 0 has 90 health left<br>Last Terran AirShip with ID: 1 has 10 health left<br>Last Protoss AirShip with ID: 0 has 90 health left<br>Phoenix with ID: 0 killed enemy airship with ID: 1<br>Last Terran AirShip with ID: 0 has 150 health left<br>Last Protoss AirShip with ID: 0 has 90 health left<br>Last Terran AirShip with ID: 0 has 130 health left<br>Last Protoss AirShip with ID: 0 has 90 health left<br>Last Terran AirShip with ID: 0 has 110 health left<br>Last Protoss AirShip with ID: 0 has 90 health left<br>Last Terran AirShip with ID: 0 has 90 health left<br>Last Protoss AirShip with ID: 0 has 80 health left<br>Last Terran AirShip with ID: 0 has 70 health left<br>Last Protoss AirShip with ID: 0 has 70 health left<br>Last Terran AirShip with ID: 0 has 50 health left<br>Last Protoss AirShip with ID: 0 has 60 health left<br>Last Terran AirShip with ID: 0 has 30 health left<br>Last Protoss AirShip with ID: 0 has 50 health left<br>Last Terran AirShip with ID: 0 has 10 health left<br>Last Protoss AirShip with ID: 0 has 40 health left<br>Phoenix with ID: 0 killed enemy airship with ID: 0<br>PROTOSS has won! |
| b<br>c   | Last Protoss AirShip with ID: 0 has 200 health left<br>Last Terran AirShip with ID: 0 has 386 health left<br>Last Protoss AirShip with ID: 0 has 200 health left<br>Last Terran AirShip with ID: 0 has 322 health left<br>Last Protoss AirShip with ID: 0 has 200 health left<br>Last Terran AirShip with ID: 0 has 258 health left<br>Last Protoss AirShip with ID: 0 has 200 health left<br>Last Terran AirShip with ID: 0 has 194 health left<br>Last Protoss AirShip with ID: 0 has 150 health left<br>Last Terran AirShip with ID: 0 has 162 health left<br>Last Protoss AirShip with ID: 0 has 150 health left<br>Last Terran AirShip with ID: 0 has 130 health left<br>Last Protoss AirShip with ID: 0 has 150 health left<br>Last Terran AirShip with ID: 0 has 98 health left<br>Last Protoss AirShip with ID: 0 has 150 health left<br>Last Terran AirShip with ID: 0 has 66 health left<br>Last Protoss AirShip with ID: 0 has 150 health left   |

|               |  |
|---------------|--|
|               | <p>Last Terran AirShip with ID: 0 has 34 health left<br/> BattleCruiser with ID: 0 killed enemy airship with ID: 0<br/> TERRAN has won!</p>  |
| bvbvv<br>pcpc | <p>Last Protoss AirShip with ID: 3 has 200 health left<br/> Carrier with ID: 3 killed enemy airship with ID: 4<br/> Last Terran AirShip with ID: 3 has 134 health left<br/> Last Protoss AirShip with ID: 3 has 155 health left<br/> Carrier with ID: 3 killed enemy airship with ID: 3<br/> Last Terran AirShip with ID: 2 has 450 health left<br/> Last Protoss AirShip with ID: 3 has 100 health left<br/> Last Terran AirShip with ID: 2 has 314 health left<br/> Last Protoss AirShip with ID: 3 has 45 health left<br/> Last Terran AirShip with ID: 2 has 178 health left<br/> BattleCruiser with ID: 0 killed enemy airship with ID: 3<br/> BattleCruiser with ID: 2 killed enemy airship with ID: 2<br/> Last Protoss AirShip with ID: 1 has 200 health left<br/> Last Terran AirShip with ID: 2 has 94 health left<br/> Last Protoss AirShip with ID: 1 has 200 health left<br/> Last Terran AirShip with ID: 2 has 10 health left<br/> Last Protoss AirShip with ID: 1 has 200 health left<br/> Phoenix with ID: 0 killed enemy airship with ID: 2<br/> Last Terran AirShip with ID: 1 has 86 health left<br/> Last Protoss AirShip with ID: 1 has 185 health left<br/> Last Terran AirShip with ID: 1 has 34 health left<br/> Last Protoss AirShip with ID: 1 has 170 health left<br/> Carrier with ID: 1 killed enemy airship with ID: 1<br/> Last Terran AirShip with ID: 0 has 434 health left<br/> Last Protoss AirShip with ID: 1 has 10 health left<br/> Last Terran AirShip with ID: 0 has 382 health left<br/> Last Protoss AirShip with ID: 1 has 10 health left<br/> Last Terran AirShip with ID: 0 has 330 health left<br/> Last Protoss AirShip with ID: 1 has 10 health left<br/> Last Terran AirShip with ID: 0 has 278 health left<br/> Last Protoss AirShip with ID: 1 has 10 health left<br/> Last Terran AirShip with ID: 0 has 226 health left<br/> Last Protoss AirShip with ID: 1 has 10 health left<br/> Last Terran AirShip with ID: 0 has 174 health left<br/> BattleCruiser with ID: 0 killed enemy airship with ID: 1<br/> Last Protoss AirShip with ID: 0 has 90 health left<br/> Last Terran AirShip with ID: 0 has 154 health left<br/> Last Protoss AirShip with ID: 0 has 90 health left<br/> Last Terran AirShip with ID: 0 has 134 health left<br/> Last Protoss AirShip with ID: 0 has 90 health left<br/> Last Terran AirShip with ID: 0 has 114 health left<br/> Last Protoss AirShip with ID: 0 has 90 health left<br/> Last Terran AirShip with ID: 0 has 94 health left<br/> Last Protoss AirShip with ID: 0 has 80 health left<br/> Last Terran AirShip with ID: 0 has 74 health left<br/> BattleCruiser with ID: 0 killed enemy airship with ID: 0<br/> TERRAN has won!</p> |