COS214 Project Report

Optimal Circuitry

Matthew Penning	u04948433
Nathan Opperman	u21553832
Danie Schoeman	u15036058
Matthew Verster	u16016239
Israel Bango	u04865503
Bandisa Masilela	u19028182

Contents

Task 2 - Design

2.1 - Functional Requirements

For this project we will be implementing 10 Patterns (refer to Question 2.3).

The overall idea for this project will be a war simulation. There will be multiple countries that will have the option to form alliances among each other, making it possible to share/send each other troops. These troops will form part of an attack rating and defence rating, that will determine the amount of damage they will do to enemy countries.

Different types of troops will have different rating scores (ground infantry = 1pt, Tank = 10pt). These attacks and defences will be turn based from country to country and will continue until all enemy countries as well as their allies have been defeated.

The following is a brief description on what our design patterns will be used for:

The **Abstract Factory** as well as a **Factory** will be used for the creation of our countries, meaning each country will be assigned a name, troops and alliance.

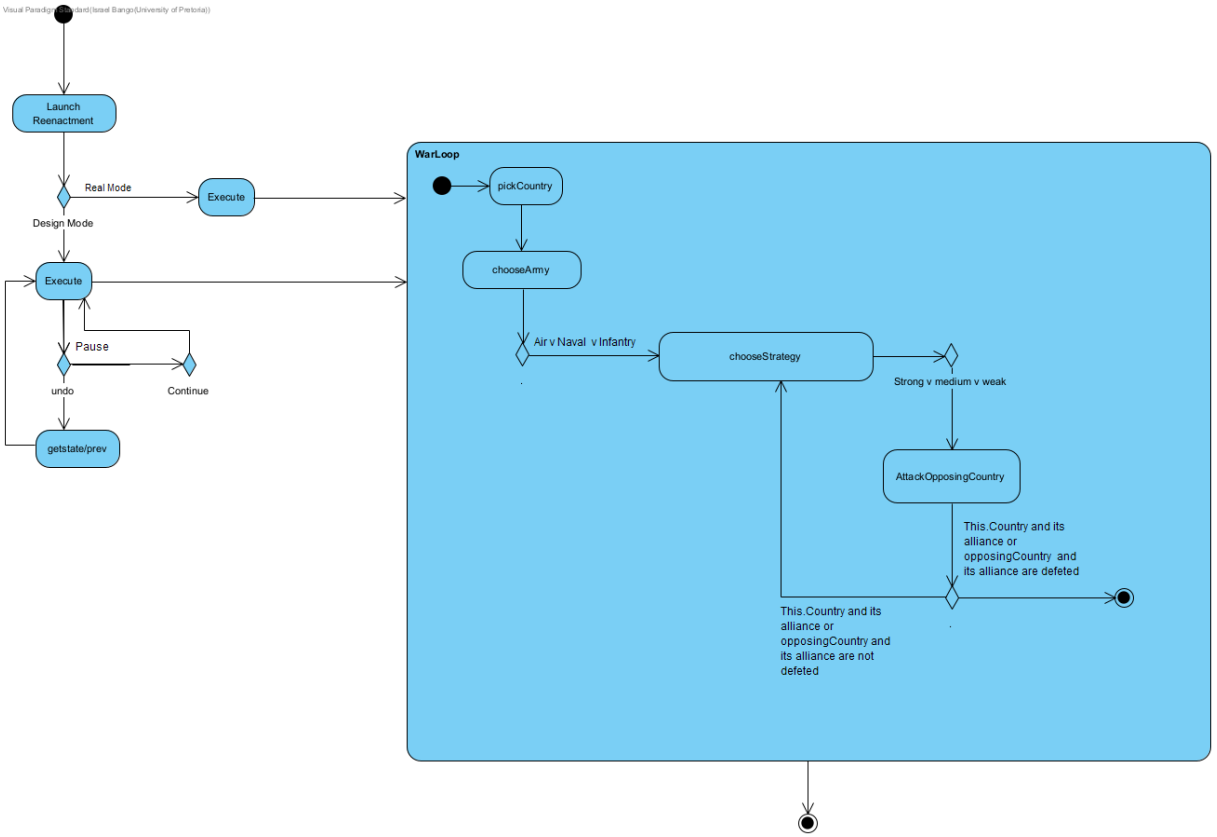
The **Memento** pattern will be used to save the current state of the war during the “Design mode war simulation”, after the **Command** pattern stops the simulation, it will save all the current relationship between countries as well as their attack power when the simulation is interrupted. Once saved, the user will resume the battle using the *Command* pattern once again.

The **State** and **Strategy** pattern will be working together. This will be done by having three different states (*Attack*, *Counter Attack*, *Defence*), these states will depict on how the countries act. *Attack* is will be used when a country decides to launch an invasion on another country, once a country launches and attacks the attacked country will have 2 options either a *Counter Attack* or *Defence* monver. *Counter Attack* is a chance to weaken enemies during their *Attack* however, will lower your *Defence* troops, making it possible for you to lose your country. *Defence* State, will offer a safe way to defend against the attack, making it possible to fight another day if successful.

Each of these states will offer a simple strategy option (*Strong, Medium, Weak*), these strategies will dictate how many troops/attack power will be used in the states mentioned above.

The **Observer** will be a simple implementation. It will simply be used to observe the current country's *State* and if change it once the country is fished *Attacking/Defending.*

2.2 - Activity Diagrams



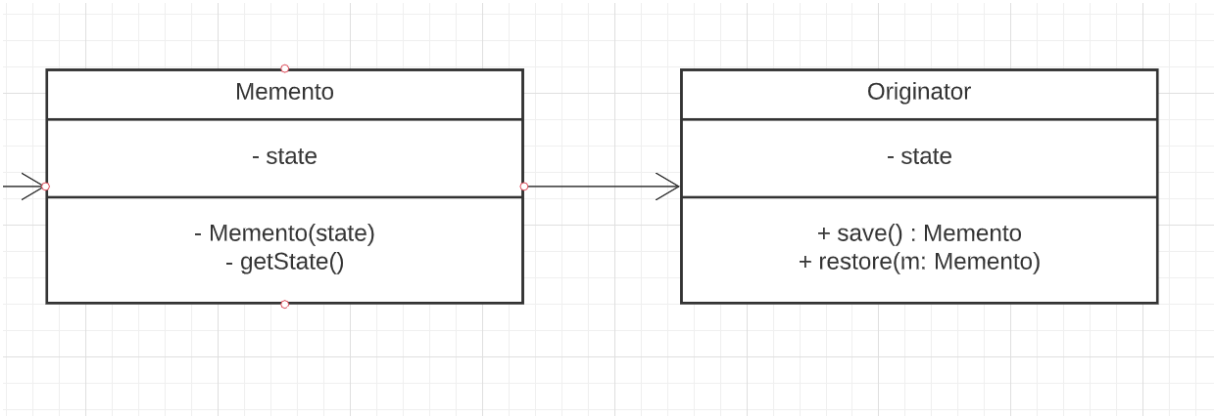
2.3 - Design Patterns to be Implemented

The following design patterns will be implemented by this project in order to meet the functional requirements laid out in Section 2.1.

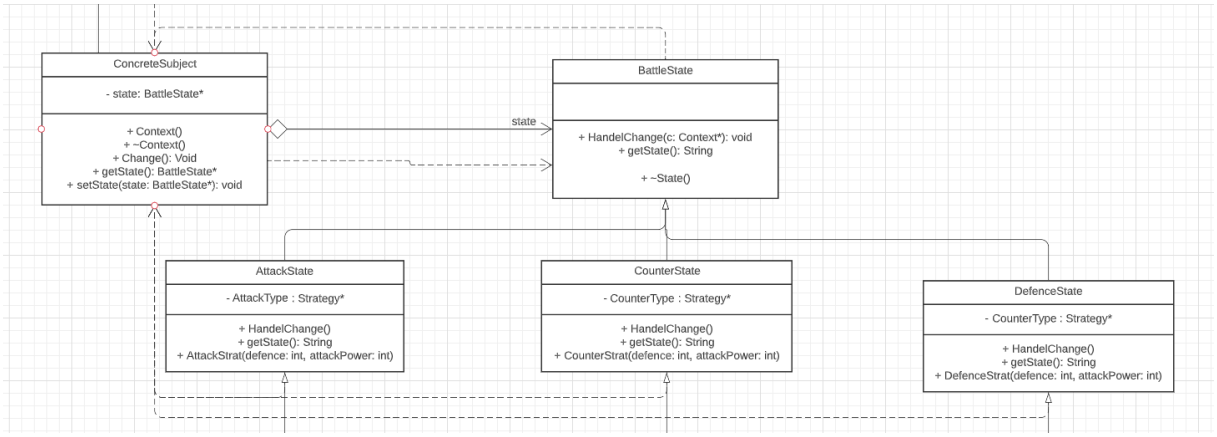
- Memento
- State
- Strategy
- Command
- Abstract Factory
- Observer
- Prototype
- Composite
- Factory Method
- Template Method

2.4 - Classes for Identified Patterns

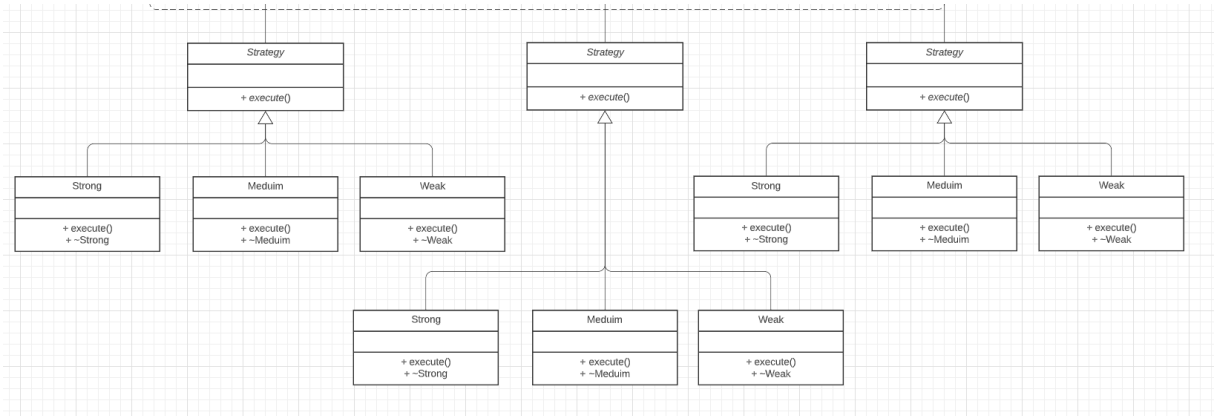
Memento



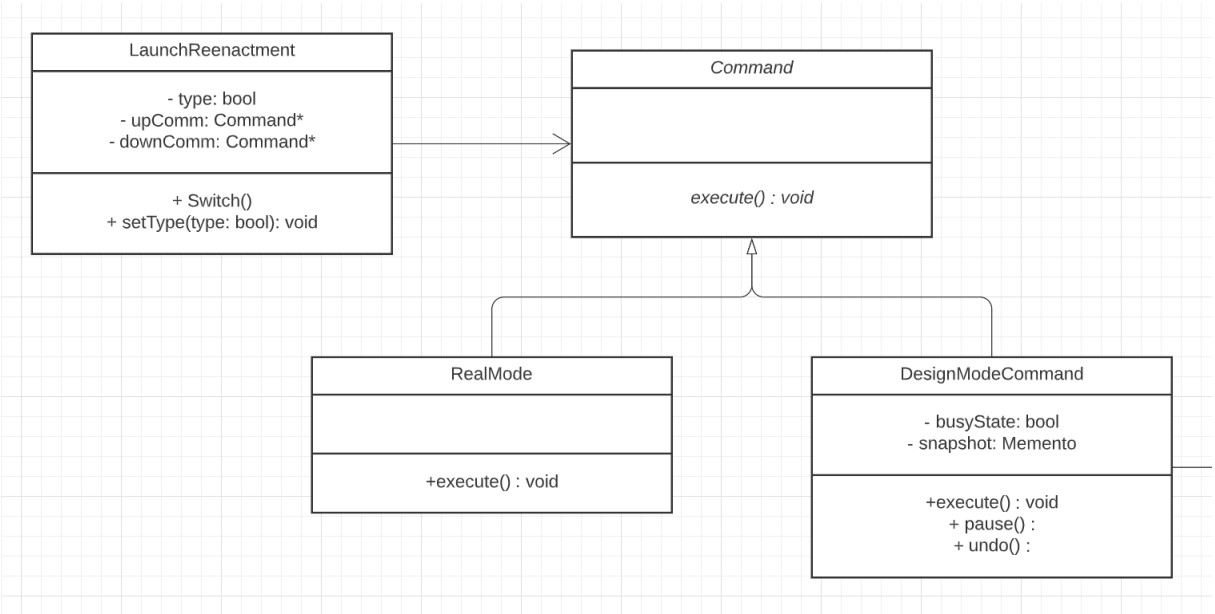
State



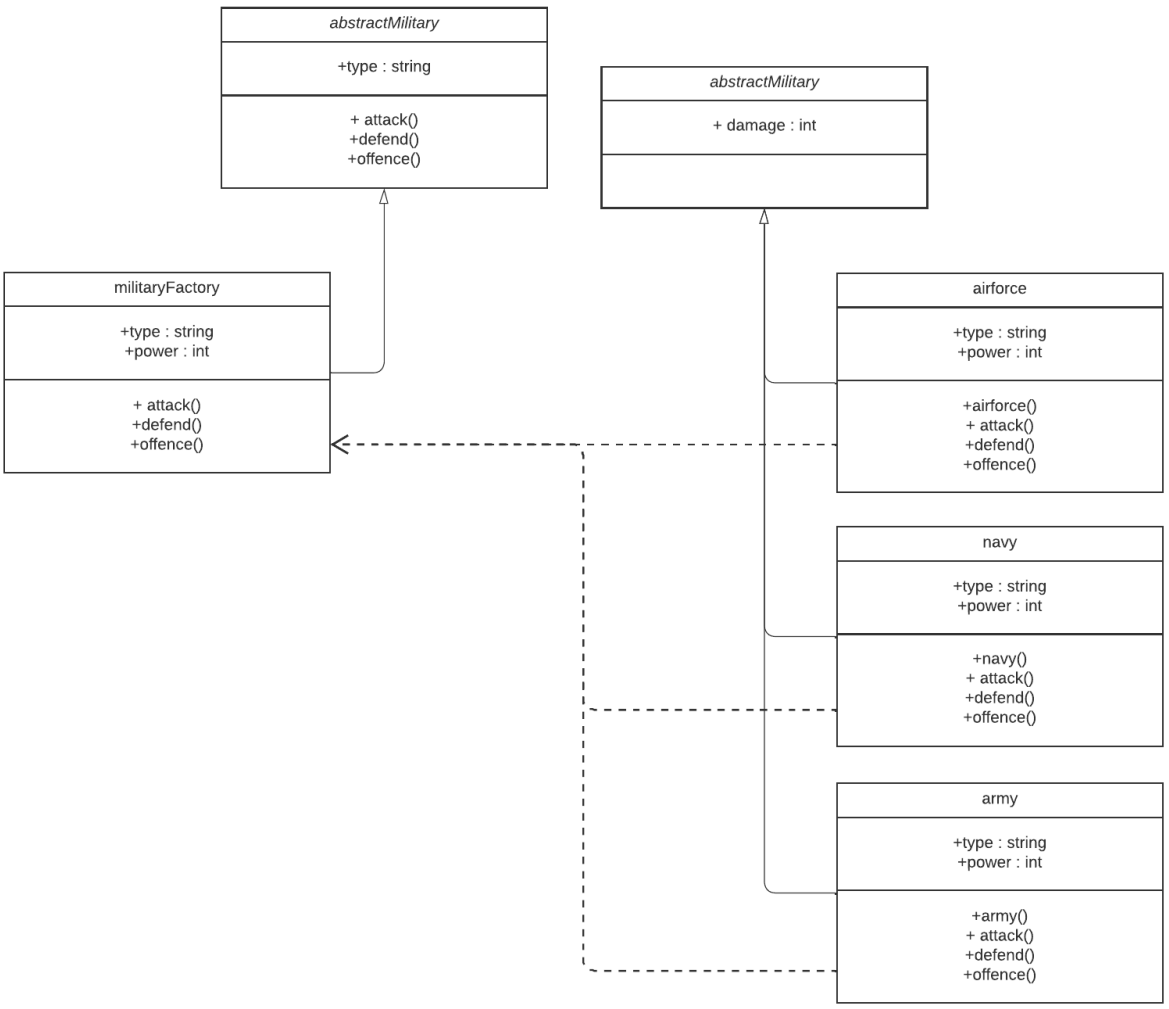
Strategy



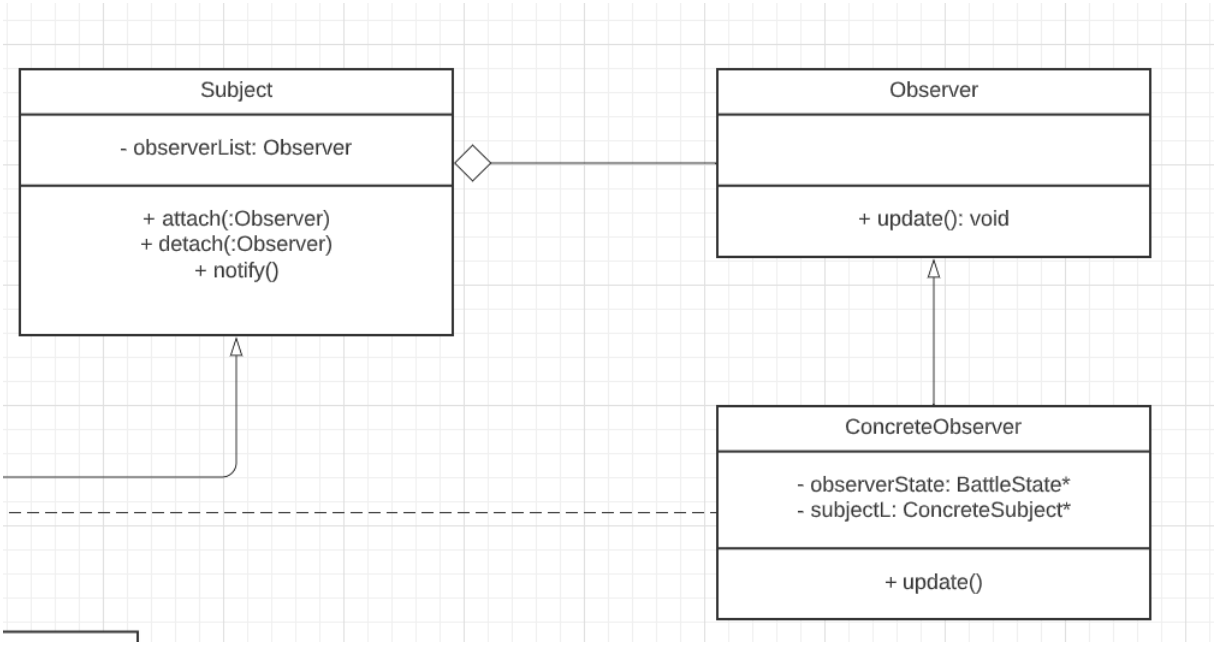
Command



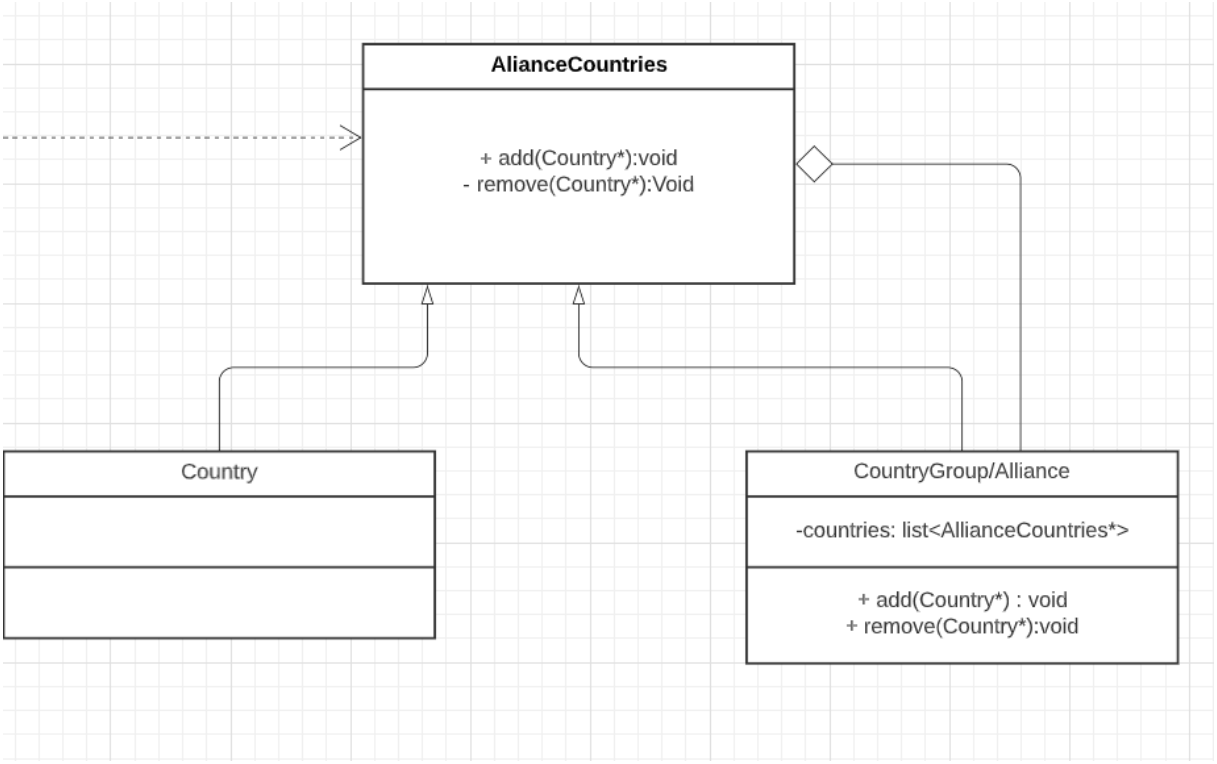
Abstract Factory



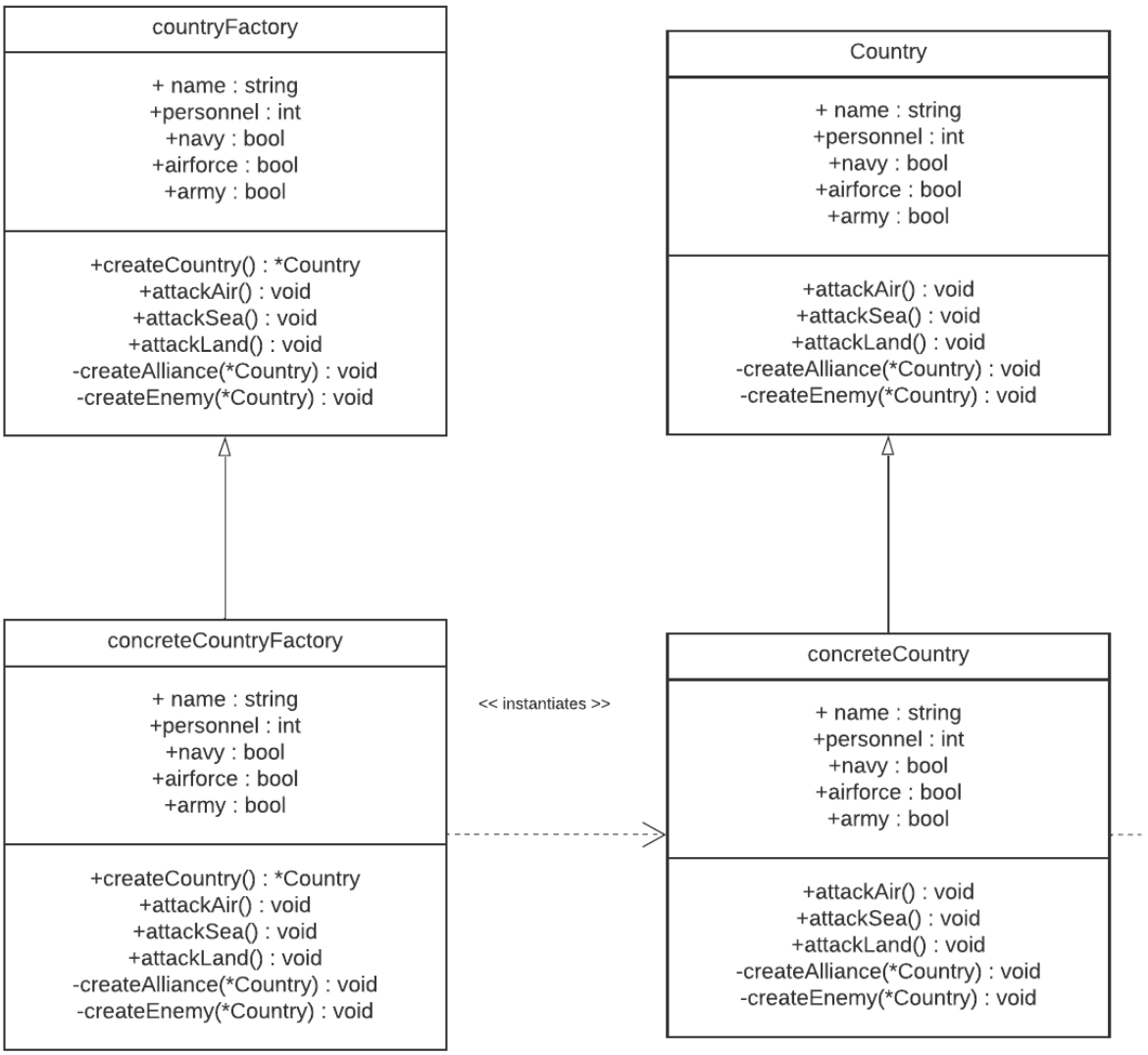
Observer



Composite



Factory

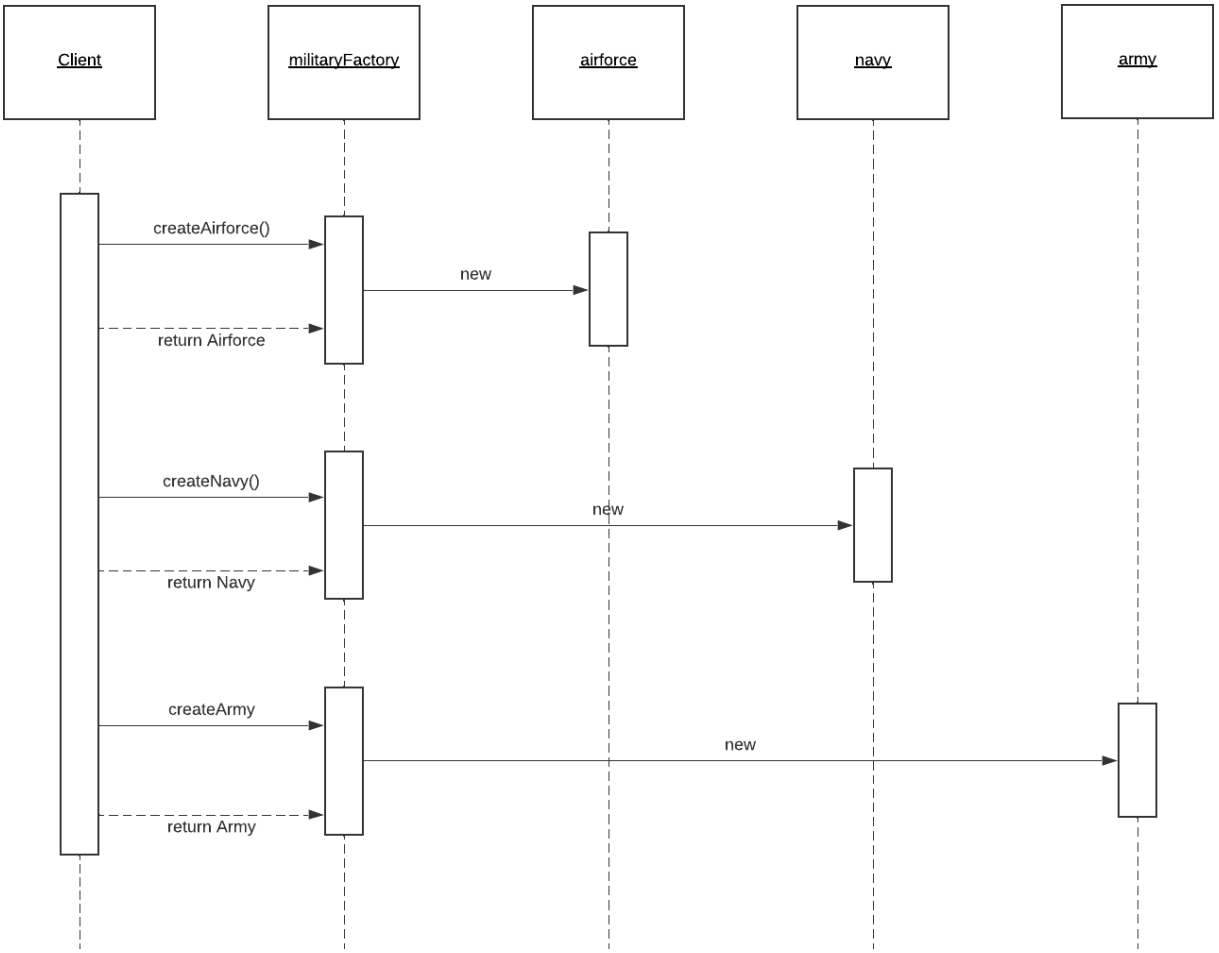


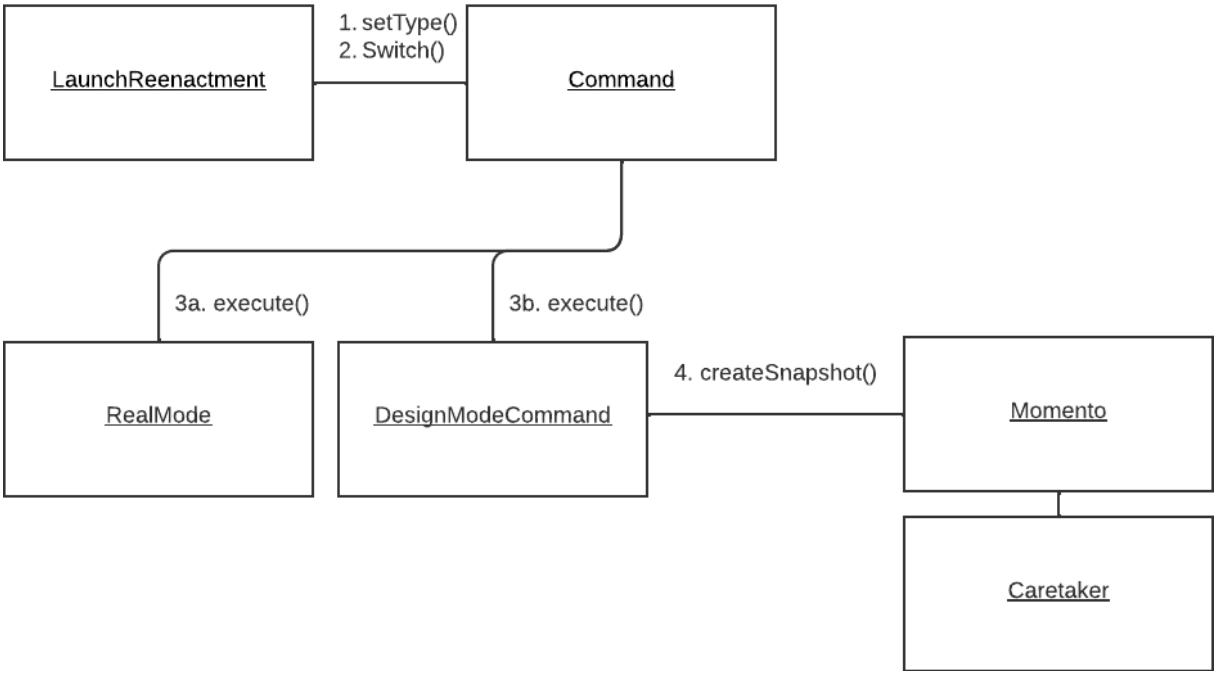
2.5 - System Class Diagram

Please refer to the following link to view the comprehensive system class diagram:

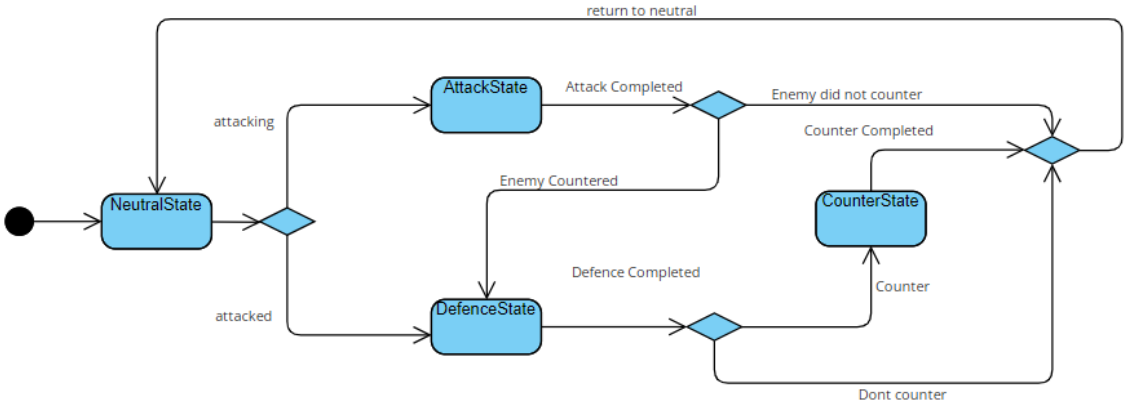
https://lucid.app/lucidchart/a7cc8ad8-fe4c-408c-945c-6d93ac6fb242/edit?page=HWEp-vi-RSFO&invitationId=inv_8e77e7c3-87cf-4233-ab70-e9a14a0c898e#

2.6 - Sequence & Communication Diagrams





2.7 - State Diagram



2.8 - Object Diagrams