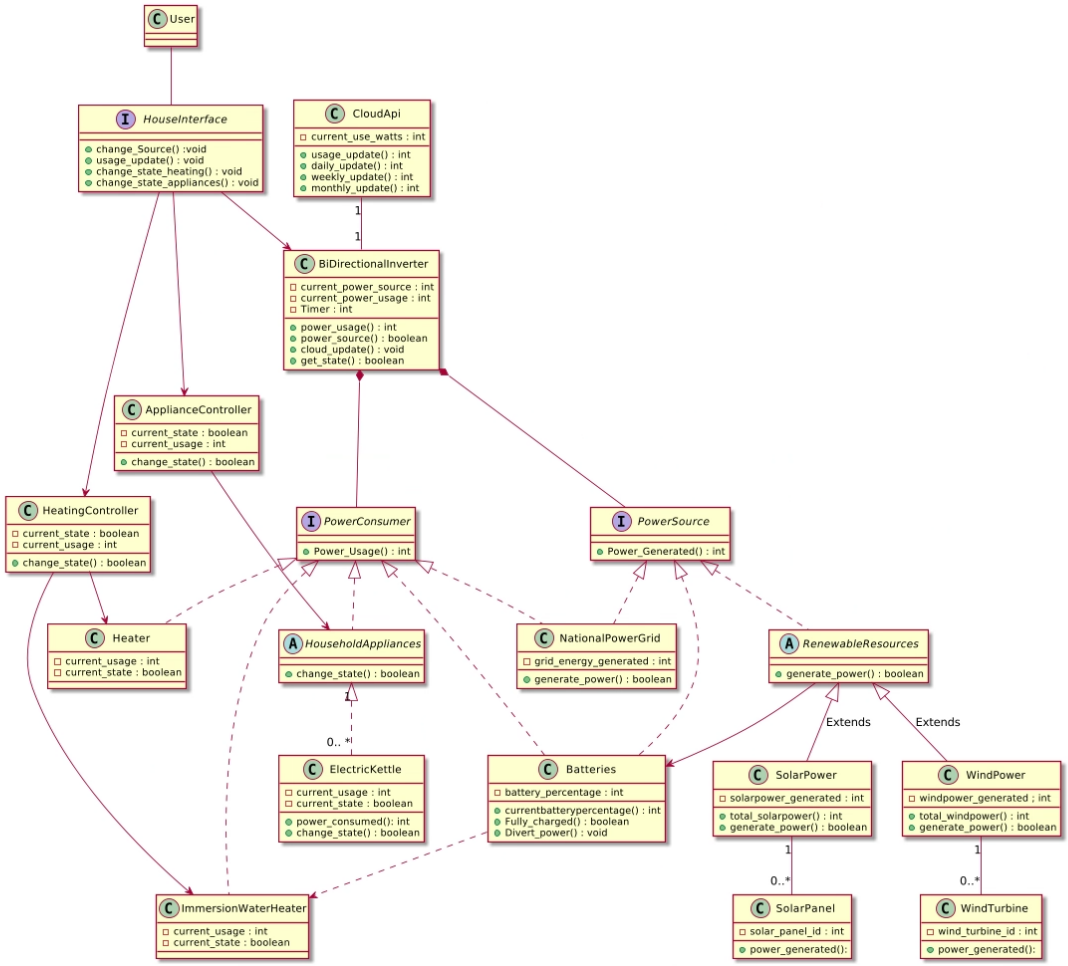
SCC204 Coursework

Design and Architecture

1)



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2)

SOLID PRINCIPLES

Single Responsibility Principle(SRP)

Single responsibility states that each module should be responsible for only one actor and this can be applied to my class diagram which can apply to the solar panel and wind turbine classes as they are responsible for a single change without affecting the responsibility of another class so they can easily be decoupled and used by a separate actor.

Open-Closed Principle(OCP)

Modifying a class increases the risk of breaking already working code so to make the working code more extensible is the only viable option. For example the use of renewable resources class and the household appliances class also makes use of the open-closed principle as they are classes which can be extended but not modified. For example in the case of renewable resources it is given that there is room for expansion so additional renewable energies such as hydro energy can be added and extrend from renewable resources class to use the generate power function and for the instance of household appliances it can be extended without modification using the change state function.

Liskov Substitution Principle(LSP)

The PowerSource interface and PowerConsumer interface makes use of the Liskov substitution principle by having functions that can be extended to different classes. This principle is useful as it decreases the risk of breaking already working code and not clustering the bi-directional-converter which controls the flow of the power for the household.

Interface Segregation Principle(ISP)

In the interface segregation principle it is stated that a client shouldn't depend on methods they don't use as when a change takes place due to another client being linked to the same class even though the current client doesn't make use of the other methods, it would have to recompile and reused whereas if they were split up into interfaces where the client depends on all the methods of that interface then the interface segregation principle is applied to power source and power consumer interfaces as they have a single method which is implemented by the classes that inherit from it

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3)

Assumptions

- One assumption is that the power source interface and the power consumer interface can't exist without the bi-directional-inverter as it controls the flow of power
- Assume that there is an appliance controller as the system should be able to turn on or off any appliance connected to the system
- Assume that the immersion water heater is connected to the heating controller so in the instance of turning on or off the heating it affects all heating systems
- That the heating controller is directly accessible through house interface just as much as the appliance controller
- The temperature of the heating within the household isn't controlled by the system
- Assume that the cloud api handles all data about usage of power within the household and being able to store them to check afterwards as well
- At any given time the bi directional inverter can check the current states of the appliances and heating in the household
- Assume there is a 1 to many relationship for solar panels and wind turbines due to expansibility of the system
- The batteries divert power to the immersion water heater automatically when the batteries are full
- Assume that the grid will be the main energy provider incase the battery depletes and renewable resources arent accessible
- The bi-directional-inverter has access to a network which wont disconnect as it relies on recording the updates in cloud api every 5 minutes

4)

1. Reports the daily usage of energy consumption within the household and it is deemed important as it gives a guage of how much energy has been used that day.
2. Reports the current state of any appliances or heaters within the household and it is important for the user to know if anything is consuming power when it isn't supposed to.
3. Reports the amount of power generated due to renewable resources to the user which can be important for various reasons. I.e could sell power to the grid or thoughts on expanding renewable resources to cut back on energy costs through the grid
4. The current charge within the batteries which can be considered important when renewable resources generate the least and how to utilise the charge within the batteries.