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Object Oriented Analysis: Potential Classes and Methods [3 marks]

Read the following paragraph and pull out potential **nouns** that may lead to classes and **verbs** that may lead to relationships and methods according to Object Oriented Analysis.

I am trying to make an electric, software-controlled bagpipe or organ (a hybrid). It is powered by an electric air pump (computer-controlled) which can vary pressure. It has 24 pipes attached to it, each pipe is attached to an electric air valve which lets air through. I want the software to allow me to turn each valve on and off, as well I want to control the air pressure of the pump. Furthermore I need an interface which will convert MIDI notes to valve on and off commands at the right times.

List the potential Classes:

List the potential Actions/Methods/Relationships:

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UML: **Composition** or **Aggregation**? [3 marks]

Convert this Java code to a **UML class diagram**. This Java code is meant to represent participants in alien abductions: Spaceships, Martians, Specimens and the power sources of the Spaceship. Spaceships **need** at least 1 power source to operate. Draw a well-designed UML class diagram to represent this information. Provide the basic abstractions, attributes, methods, relationships, multiplicities, and navigabilities as appropriate.

```
public class Spaceship
{
  Collection<Martian> crew;
  Collection<Specimen> abuctees;
  Collection<PowerSource> sources;
}
```

```
public interface Animal { ... }
public class Martian implements
Animal { ... }
public class Specimen implements
Animal { ... }
public class Land { ... }
public class RuralFarmland extends
Land { ... }
```

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Use Cases and Use Case Diagram [3 marks total]

What are **three** primary use cases of the following situation:

## Background:

I want to go skiing or participate in another kind of activity with my friends but we have to share some expenses. It is often difficult to get reimbursed for my expenses and it is hard to track. I want to simplify the transaction.

## Description:

I want to design and post an activity, specify the range of people and define a budget for the activity. If someone wants to participate in this activity they must first agree to it. A participant will be required to pay a portion of the costs (divided equally among participants) and the system will take their money. The activity designer will be expected to cover all costs and thus will receive all of the budget once the activity is done.

**Use case 1:**_____

**Use case 2:**_____

**Use case 3:**_____

Now complete this **UML use case diagram**, including boundary, actors, use case bubbles and relationships between actors and use case.

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UML Sequence Diagrams: [3 marks]

Convert this use case into a **sequence diagram,** remember to include all the actors, the components, the lifelines and use good names for the methods.

Use Case: **Paying** for a meal with a wireless card reader.

1. In order to pay for a meal, a **restaurant server** has to *authorize* the **wireless card reader** to accept a payment of a certain value.
2. I approach the **wireless card reader** and *click agree* that I intend to pay this amount.
3. The **wireless card reader** *displays* a prompt for tip.
4. I *enter* the tip amount then click *confirm*.
5. The **wireless card reader** thanks me, **records** my transaction and **sends** it to the bank for authorization.
6. The **bank** responds with an authorization (or decline) and the **wireless card reader** displays the result.

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Software Engineering: Software Development Processes [3 marks]
Keep the responses short. A long response that is not on topic is dangerous.

Explain *what* an **iteration** is within a software development process. [1 marks/3]

*What* are **2** *needs* and *issues* that **Agile Software Development** sought to address [1 marks/3]

List 1 **benefit** and 1 **disadvantage** of **prototypes**. [1 marks/3]