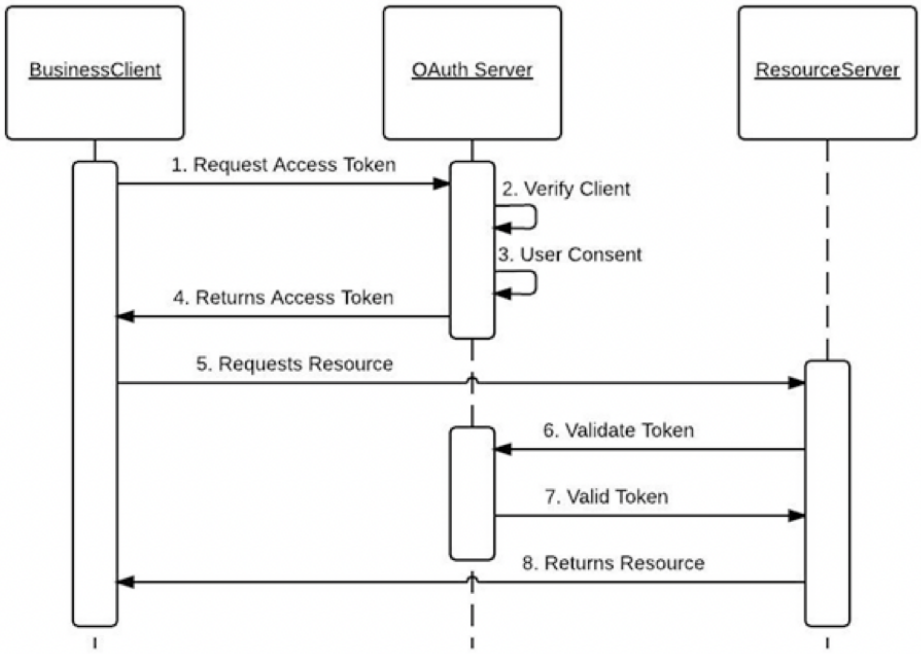
Week 6: Dynamic Models

1. **Reading UML sequence diagrams** In plain English sentences, describe the scenario represented by the following UML sequence diagram. You can read more about this (real world!) scenario at https://docs.oracle.com/cd/E82085_01/160027/JOS%20Implementation%20Guide/Output/oauth.htm



SOLUTION:

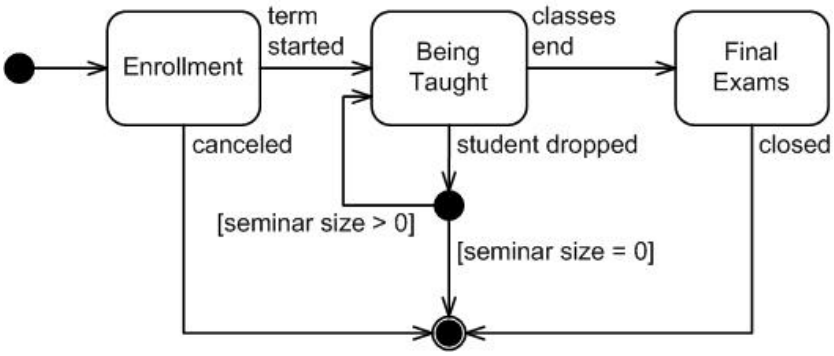
There are 3 classes interacting in this diagram: a business client, an authorisation server and a resource server.

First the client requests an access token, then the authorisation server verifies the client and the user consent.
Next the authorisation server returns an access token to the business client.
Finally the business client requests a resource from the resource server.
The server responds to the authorisation server with a validate-token message and then the authorisation server returns a valid token message. This exchange checks that the business user's to-

ken is valid.
Finally the resource server returns the resource that was requested to the business client.

This diagram does not include any alternate flows for invalid actions.

2. **Reading UML state diagrams** In plain English sentences, describe the scenario represented by the following UML state diagram. For more details see the source for this example which includes actions for managing a waiting list and actions for state changes. https://www.tutorialspoint.com/uml/uml_statechart_diagram.htm



SOLUTION:

This state diagram represents the process of enrolling in a class.
Initially the class is ready for enrolment.
Once term has started the class changes to the being taught state.
Alternatively if the class is cancelled then the state machine terminates.
While being taught a student can drop the class.
If the class size remains at more than 0 then the class continues to be taught, else (size=0) it terminates.
When classes end then the system transitions to final exam state.
On completion of the exams the class is closed.

3. **Developing UML sequence diagrams** Consider the following scenario for registering a patient in a hospital management system.

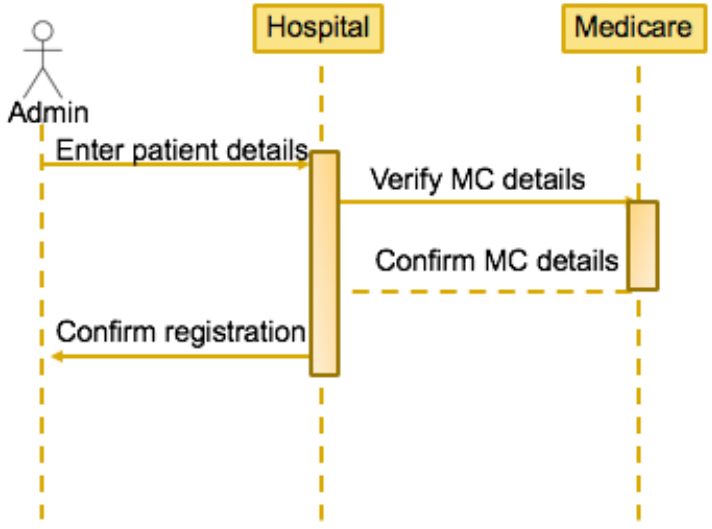
> The administrator enters the patient's name, address, data of birth and emergency contact details into the system. If the patient has only public health insurance, the administrator enters the patient's Medicare number, and the system verifies this with government health database. If the patient also has private health insurance, then the administrator enters also the patient's private health insurance details, and verifies these details with the private health insurance system. When these details are verified as correct, the system saves the patient's details and confirms the registration

(a) Identify the actors in this scenario

SOLUTION: The actors are Patient, Administrator, Government Health Database, Private Health Database.

(b) Sketch a UML sequence diagram for the scenario where the administrator registers a patient who as only public health insurance.

SOLUTION:



I have not included alternative paths for eg invalid medicare details (since they were not asked for!) but you could add these. Also note that the question only asks for the medicare scenario, not the private health scenario. Again you could add this as an exercise if you wish.

4. **Developing UML state diagrams** Draw a UML state diagram to describe the states of the following security light system.

   A security light system has a switch and a motion sensor attached. It can be either armed or unarmed. If the switch is in the off position the light is off and the system is unarmed. When the switch is turned on, the light stays off but the system is armed. If the system is armed and the motion sensor detects movement, the light comes on. If no movement is detected for 5 seconds, the light goes off.

SOLUTION: