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CS 2310 - SOFTWARE ENGINEERING

Exercise 1

1. Activities Breakdown

IC Card IC Name: Organize health care system

Description: Organize a health care system
Interaction Pattern:

Mixed

My Task: Specify and organize the activities of a health care system
Time Critical Condition: none
Name of Other IC: none
Message to Other IC: none
Other IC's Task: none
Card 1of 1 (If necessary please use several IC cards to describe an IC)

Broken down into the following tasks:

- Schedule routine appointment
  - Scheduling system
- Schedule non-routine appointment
  - Scheduling system
- Emergency walk-in
- Create/Update patient records
  - Medical Records Database
- Conduct basic patient screening
  - Check blood pressure
    - Blood pressure sensor
  - Check blood sugar
    - Blood sugar meter
  - Check body temperature
    - Temperature sensor
  - Check pulse
    - Pulse meter
- Conduct diagnosis
  - Examine patient symptoms
  - Order tests from labs
    - Lab
  - Analyze test reports

- Decide actions for treatment
  - Treat by prescribing medicines
  - Treat by preventive care
  - Treat by surgery
  - Treat by therapy
- Patient paperwork for insurance

2. IC Cards Specification

IC Card IC Name: Schedule routine appointment

Description: Make a routine appointment for check-up
Interaction Pattern:

Mixed

My Task: Select routine appointment type and specify any requirements (such as female doctor)
Time Critical Condition: none
Name of Other IC: Scheduling system
Message to Other IC: Give me the list of available physicians and time slots according to requirements
Other IC's Task: Retrieve the list of available physicians and time slots according to requirements
Card 1of 1 (If necessary please use several IC cards to describe an IC)

IC Card IC Name: Schedule non-routine appointment

Description: Make a non-routine appointment for a specific medical problem
Interaction Pattern:

Mixed

My Task: Select a non-routine appointment type and specify the medical problem along with any other requirements
Time Critical Condition: Within a week or a month (depending on seriousness of medical condition)
Name of Other IC: Scheduling system
Message to Other IC: Give me the list of available relevant doctors and time slots according to requirements
Other IC's Task: Retrieve the list of available relevant doctors and time slots according to requirements
Card 1of 1 (If necessary please use several IC cards to describe an IC)

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IC Card IC Name: Scheduling system

Description: Scheduler finds all available doctors and time slots that meet the patient requirements
Interaction Pattern:

By Myself with Interaction

My Task: Generate list of available doctors and time slots according to patient requirements
Time Critical Condition: none
Name of Other IC: Patient
Message to Other IC: Pick a doctor and time slot from the list
Other IC's Task: Pick a doctor and time slot
Card 1of 1 (If necessary please use several IC cards to describe an IC)

IC Card IC Name: Emergency walk-in

Description: Patient with an emergency
Interaction Pattern:

By Others with Interaction

My Task: Go to emergency department or seek ambulance
Time Critical Condition: Immediately
Name of Other IC: Emergency medical staff
Message to Other IC: none
Other IC's Task: Attend the patient immediately and admit patient if needed
Card 1of 1 (If necessary please use several IC cards to describe an IC)

IC Card IC Name: Create/Update Patient Records

Description: Create or update patient biographical data and history in the database
Interaction Pattern:

By Myself with Interaction

My Task: Create records for new patients and update records of existing patients in the database
Time Critical Condition: None
Name of Other IC: Medical Records Database
Message to Other IC: Query or add patient information
Other IC's Task: Retrieve or upload patient information
Card 1of 1 (If necessary please use several IC cards to describe an IC)

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IC Card IC Name: Medical Records Database

Description: Database of patient data, medical history and test results
Interaction Pattern:

By Myself no Interacton

My Task: Store information of new and existing patients
Time Critical Condition: none
Name of Other IC: none
Message to Other IC: none
Other IC's Task: none
Card 1of 1 (If necessary please use several IC cards to describe an IC)

IC Card IC Name: Conduct basic patient screening

Description: Nurse conducts initial patient screening
Interaction Pattern:

Mixed

My Task: Take required patient readings from sensors
Time Critical Condition: none
Name of Other IC: Patient
Message to Other IC: none
Other IC's Task: none
Card 1of 1 (If necessary please use several IC cards to describe an IC)

IC Card IC Name: Check blood pressure

Description: Check patient blood pressure
Interaction Pattern:

By Myself with Interaction

My Task: Use sensor to blood pressure reading from meter
Time Critical Condition: Within 5 minutes
Name of Other IC: Blood pressure meter
Message to Other IC: none
Other IC's Task: Detect patient blood pressure
Card 1of 1 (If necessary please use several IC cards to describe an IC)

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IC Card IC Name: Check blood sugar

Description: Check patient blood sugar levels
Interaction Pattern:

By Myself with Interaction

My Task: Use sensor to take the reading of patient blood sugar level
Time Critical Condition: Within a few minutes
Name of Other IC: Blood sugar meter
Message to Other IC: none
Other IC's Task: Detect patient blood sugar level
Card 1of 1 (If necessary please use several IC cards to describe an IC)

IC Card IC Name: Check body temperature

Description: Check body temperature of the patient
Interaction Pattern:

By Myself with Interaction

My Task: Use the temperature sensor to take the reading of temperature
Time Critical Condition: Within 60 seconds
Name of Other IC: Temperature sensor
Message to Other IC: none
Other IC's Task: Measure patient body tempertaure
Card 1of 1 (If necessary please use several IC cards to describe an IC)

IC Card IC Name: Check pulse rate

Description: Check the pulse rate of the patient
Interaction Pattern:

By Myself with Interaction

My Task: Use the sensor to check the pulse rate of the patient
Time Critical Condition: With 60 seconds
Name of Other IC: pulse rate meter
Message to Other IC: none
Other IC's Task: Measure the patient pulse rate
Card 1of 1 (If necessary please use several IC cards to describe an IC)

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IC Card IC Name: Conduct diagnosis

Description: Make diagnosis about medical condition of the patient
Interaction Pattern:

Mixed

My Task: Gather all information about patient symptoms and tests to make a diagnosis
Time Critical Condition: none
Name of Other IC: none
Message to Other IC: none
Other IC's Task: none
Card 1of 1 (If necessary please use several IC cards to describe an IC)

IC Card IC Name: Examine patient symptoms

Description: Examine patient symptoms to make a diagnosis
Interaction Pattern:

By Myself with Interaction

My Task: Examine and evaluate the patient symptoms to diagnose the medical problem
Time Critical Condition: Within appointment duration
Name of Other IC: Patient
Message to Other IC: Inquiry about the observed symptoms
Other IC's Task: Respond with accurate information about the symptoms
Card 1of 1 (If necessary please use several IC cards to describe an IC)

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IC Card IC Name: Order tests from lab

Description: Get tests from labs to determine diagnosis
Interaction Pattern:

By Others with Interaction

My Task: Write prescription order to obtain certain lab tests
Time Critical Condition: Within a day
Name of Other IC: Lab
Message to Other IC: Show the doctor prescription to lab
Other IC's Task: Conduct the test according to the doctor instructions and report the result to the doctor
Card 1of 1 (If necessary please use several IC cards to describe an IC)

IC Card IC Name: Lab

Description: Conduct lab tests prescribed by doctor
Interaction Pattern:

By Myself with Interaction

My Task: Conduct test procedure such as obtain patient specimen or X--rays
Time Critical Condition: Within a few hours
Name of Other IC: Patient
Message to Other IC: none
Other IC's Task: Follow instructions of the test procedure
Card 1of 1 (If necessary please use several IC cards to describe an IC)

IC Card IC Name: Analyze test results

Description: Analyze test reports from lab
Interaction Pattern:

By Myself no Interacton

My Task: Analyze the test reports to make diagnosis or observe changes in patient condition
Time Critical Condition: none
Name of Other IC: none
Message to Other IC: none
Other IC's Task: none
Card 1of 1 (If necessary please use several IC cards to describe an IC)

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IC Card IC Name: Decide action for treatment

Description: Based on the diagnosis, decide the required action for treatment
Interaction Pattern:

Mixed

My Task: Decide action for treatment
Time Critical Condition: none
Name of Other IC: Patient
Message to Other IC: none
Other IC's Task: none
Card 1of 1 (If necessary please use several IC cards to describe an IC)

IC Card IC Name: Treat by prescribing medicines

Description: Prescribe medicines for treatment
Interaction Pattern:

By Others with Interaction

My Task: Write prescription for medicines
Time Critical Condition: none
Name of Other IC: Patient
Message to Other IC: none
Other IC's Task: Obtain medicines from pharmacy and take them regularly
Card 1of 1 (If necessary please use several IC cards to describe an IC)

IC Card IC Name: Treat by preventive care

Description: Treatment by prevention such as diet changes, immunizations
Interaction Pattern:

By Others with Interaction

My Task: Give instructions for preventive care
Time Critical Condition: none
Name of Other IC: Patient
Message to Other IC: Instructions for preventive care
Other IC's Task: Follow instructions for preventive care
Card 1of 1 (If necessary please use several IC cards to describe an IC)

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IC Card IC Name: Treat by surgery

Description: Treat patient by surgery
Interaction Pattern:

By Others with Interaction

My Task: Inform patient about need for surgery, get patient consent and make arrangements
Time Critical Condition: none
Name of Other IC: Patient
Message to Other IC: Details about the surgery
Other IC's Task: Approve or disapprove treatment by surgery
Card 1of 1 (If necessary please use several IC cards to describe an IC)

IC Card IC Name: Treat by therapy

Description: Prescribe therapy or counselling for treatment
Interaction Pattern:

By Others with Interaction

My Task: Inform patient about treatment by therapy and its effectiveness
Time Critical Condition: none
Name of Other IC: Patient
Message to Other IC: Details of treatment by therapy
Other IC's Task: Agree or disagree for therapy treatment
Card 1of 1 (If necessary please use several IC cards to describe an IC)

IC Card IC Name: Paperwork for insurance

Description: Complete patient paperwork for insurance company and billing
Interaction Pattern:

By Myself with Interaction

My Task: Fill the required information for insurance paperwork and billing
Time Critical Condition: none
Name of Other IC: none
Message to Other IC: none
Other IC's Task: none
Card 1of 1 (If necessary please use several IC cards to describe an IC)

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3. Patterns

In my configuration, I have decomposed purple cards into red, yellow and green cards as shown in the activities breakdown above. Object cards such as patient, medical staff, blood pressure meter, blood sugar sensor, body temperature meter and pulse meter are not shown as individual IC cards. For this assignment, I have done three levels of decomposition for activities and complicated activities such as *treatment by surgery*, *therapy, preventive care* or *emergency* have not been decomposed further.

One pattern I can identify by observing the IC cards above is that a lot of interactions between IC cards involve the flow of information and the flow of patients between multiple entities within a health care system. Information needs to be exchanged between labs and doctors, patients and medical staff, hospitals and insurance agencies, and between different medical departments. Patients need to be directed to pharmacies, labs or other medical departments such as surgery or therapy. In order to organize such activities and streamline the operations between multiple entities, the tasks have been serialized together in a logical way. For example in order to obtain the tests to diagnose a patient, the doctor gives the tests prescription to the patient and then it is the patient's responsibility to go to the lab to get the tests done. Once the tests are done, the lab sends the results directly to the doctor. After obtaining the results, the doctor is to follow up with the patient and make a diagnosis. By serializing tasks in such a manner, effective flow of patients and coordination can be achieved in a health care system to expedite the process of treatment.

Another pattern I observe is using a common object entity for indirection between entities. For instance in order to carry out the task of scheduling an appointment, a scheduling system IC card has been introduced that takes in the user requirements and returns the list of all available time slots and doctors available for appointment. Instead of the patient directly contacting the doctor and each doctor maintaining his own appointment schedule, a shared scheduling system simplifies the task and allows a global variable to handle all scheduling.

To conclude, this is an abstract view of organizing tasks for a health care system. In reality, a health care system would be much more complicated with many more levels of decomposition, indirection and serialization of tasks involved.