

National College of Ireland

Higher Diploma in Science in Computing (International) - HDCSDEVINTJAN24
Higher Diploma in Science in Computing (Software Development) HDSDEV_JAN24

Release Date: Friday 21st June, 2024

Due Date: Thursday 8th August 2024

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Distributed Systems

Continuous Assessment (CA) Type: Project

WEIGHT: The assignment will be marked out of 100 and is worth 60% of the overall marks for the module

INSTRUCTIONS: Candidates are to do this project individually.

SUBMISSION DETAILS:

There are two deliverables for this project with separate deadlines.

1. Project Proposal (Due on Monday 8th July, 2024.)

A short project proposal of approximately 500 words following the template provided at Appendix A. More details below.

2. Completed Project (Due on Thursday 8th August , 2024)

Your program code accompanied by a detailed report and video presentation about your application.

TURNITIN: All report submissions will be electronically screened for evidence of academic misconduct (i.e., plagiarism and collusion)

PROJECT DESCRIPTION:

Your task is to develop an application that **simulates** the operations of a **smart automated environment** (for example a hospital, building or office). The environment will consist of smart services and devices that inter-communicate with each other. You will design and implement a set of devices/services and messages for your application. You should begin by devising your scenario. There must be a minimum of **3 separate services** that would simulate the operations of smart-automated environment.

Your devices/services must **publish** themselves and **discover** each other. Your devices/services should communicate via **gRPC**. You must use **Java** to develop your solution. Specify what operations are supported on each “service/device” in a corresponding proto file.

To demonstrate your implementation develop a simple client GUI that will operate as a main controller that discovers and uses your **devices/services**.

The domain of your application is assigned to you based on the **last digit** of your Student ID. The devices and services you implement must be based on real world objects in the assigned domain. For example if your application domain was a Smart Zoo you might identify devices such as motion sensors, automated feeders, electronic gates or virtual fences.

Last digit of student id	Application domain
0	Smart Car
1	Smart Cinema
2	Smart City
3	Smart Factory
4	Smart Home
5	Smart Hospital Rom
6	Smart Hotel Room
7	Smart Library
8	Smart Office
9	Smart Supermarket

Example: If your student ID is x17068381 then your domain will be “Smart Cinema” as the last digit is “one”.

DELIVERABLES

Submit each of the deliverables through the dedicated Moodle links. Each of the deliverables is mandatory. Projects that do not include all of the deliverables will not receive a mark.

Project Proposal

Your proposal should follow the structure defined in the Proposal Template at Appendix A. The proposal will describe the application that you will build. Identify your assigned application domain, the overall purpose of the service, the functionalities within each service and overall contribution of the services to the application. Your application will use gRPC as the main communication mechanism. Explain in detail the service definition and RPC (for each of the services) with examples of the request and response for each functionality within the service. Explain the parameters in detail (their meaning and datatype)

Final Project Submission

Report

A report which details the scenario and services you have used. Additionally, this should specify the message formats for data exchange and service actuation.

The report must have all the headings of the marking scheme including

- Service Definitions
- Service Implementations
- Naming Services.
- Remote Error Handling & Advanced Features
- Client - Graphical User Interface (GUI)
- GitHub – link to Github repo

Program Code

Upload your source code as a zip file

Code must also be available in a private **GitHub** repository, the repo must have a commit history, not a last-minute code dump. Include a link to the repository in your report.

Video Presentation

A video presentation with audio which demonstrates the different parts of your application. The presentation should be recorded and not exceed a total of 10 minutes in duration. The recording should be made by you with your camera and microphone on and with the camera view of you and the audio in your own voice included in the recording.

MARKING SCHEME (100 marks representing 60% of final module marks).

Project Deliverable	Available marks	%marks
Proposal	5	5%
Report	5	5%
Video Presentation	8	8%
Code: Code: Service Definitions	For each of the 3 different services/devices a corresponding proto file is defined and used [3 services * 2 marks each = 6%] All 4 different types of RPC invocation styles have been used (simple RPC, server- side streaming RPC, client-side streaming RPC, bidirectional streamingRPC) [4 styles * 2 marks each = 8%]	14%
Code: Service Implementations	Implement 3 sufficiently complex service implementations All 3 services should be written in Java. [3 services * 8 marks each = 24%] Additional service complexity and implementation [3 services * 2 marks each = 6%]	30%
Code: Naming Services. Use of jmDNS	Registration [3 services * 2 marks each = 6%] Discovery [3 services * 2 marks each = 6%]	12%
Code: Remote Error Handling and Advanced gRPC	Appropriate error handling for remote invocations and error messaging. Cancelling of messages [5%] Use of Metadata, Deadlines, Authentication etc [5%]	10%
Code: Graphical User Interface	The client for each of the 3 services that allows viewing (presentation and , discovery of services), control (passing parameters) and invocation of the	10%

	services/devices [3 services * 2 marks each = 6%] The GUI can be developed in any language, technology of choice (Java application, web based, etc) [4%]	
Code repo	Github repo with a commit history	6%