Project
Software Architecture

Introduction

The objective of this project is to develop an architecture for a realistic software system using the concepts presented in class. This is a job for a group of, at most, 4 students. The group shall propose and document a software architecture and conduct its evaluation.

This project represents the first opportunity to put into practice the knowledge acquired in class and deepen the fundamental principles and practices of architectural design. This work aims to promote the deepening of thinking about what motivates the design decisions of an architecture, architectural practice reasoning and production of appropriate documentation.

Overall description of the project

Your company was hired to develop a smart home system that must provide a customizable web and mobile interface for the end users, which must be able to integrate all IoT devices that can be connected to Google Home, Alexa, LG Smart Home, as well as enable companies that develop custom hardware to plug those devices to the same ecosystem.

The goal is not to replace the current ecosystems, is to extend them, with new functionalities in terms of interfaces available, and devices that can be plugged. As an example, google home can only be accessed in mobile phone, LG TVs only support a specific set of devices. With the new system it should be possible to control home devices from a web-browser in a computer, a mobile phone and a smart tv. In terms of devices, it should be possible to integrate all types of IoT devices available for a smart home and provide an API for developers to integrate new devices based on the ESP32 board. Another selling point for the new system is that the same set of devices can be used in smart offices and smart manufacturing environments enabling digital transformation scenarios.

Privacy and Security are of the utmost importance. In terms of privacy the system must comply with “privacy by design and by default” principles which are the basis of the modern data privacy regulations and must resist unwanted actions of malicious actors from the internet as well as from ones connected to the local network.

Each group will need to select two Digital Transformation Scenarios either for an office, retail or manufacturing company that can be addressed with IoT devices, detail the ASRs and develop an

architecture for the system.

Milestones

There will be five milestones as described in the following table.

Milestone Description	**Due date**
Scenario selection 1 List the digitalization scenarios and first draft of the ASRs	**05/03/2024**
Architecture V1 (Mid-term presentation) Refine ASR and create the first version of the architecture. Identify and prioritize the defects and create a workplan for the next phase.	**02/04/2024**
Architecture V2 Refine ASR and create the second version of the architecture consistent with all the documentation guidelines and templates provided in class.	**23/04/2024**
Evaluation 2 Perform a complete in-depth evaluation of the architecture documentation, prioritize the defects and create a workplan for the next phase.	**07/05/2024**
Architecture Final Version (Final presentation) Refine the architecture documentation to remove the defects, following the workplan defined in Evaluation 2, and submit the final documentation package.	**21/05/2024**

Mid-term Presentation

The mid-term presentation goal is to assess your progress in the project, advise on possible improvements or corrective actions, and provide a first grade on the project.

Each group should prepare a presentation containing the following components:

1. A brief description of the project context and business goals of the system.
2. The architectural drivers: identify and describe the functional requirements. Include a prioritized list of quality attributes. Describe technical constraints.
3. High level view of the architecture.

Final Presentation

The goals of the final presentation are to present and describe the final outcome of the architecture design process, which contains the description of the project including project context, the architectural drivers, views of architecture and descriptions, rational and logical analysis/comparison of key design decisions and the evaluation results.

Each group should prepare a presentation that contains the following components:

1. A brief description of the project context and business goals of the system.
2. The architectural drivers: document the functional requirements of the way that is most convenient or usual. Include a prioritized list of quality attributes. Describe business and technical constraints.
3. A description of the proposed architecture using the architectural views and textual descriptions you deem most appropriate to communicate and assist in project analysis. Should follow the documentation guidelines presented in class. Poor documentation

practices will be heavily penalized.

4. An analysis / evaluation / validation of the architecture based on the architectural drivers, as described above. The analysis must set out the key issues and how they are considered on the architecture in relation to the drivers defined previously. They should include a discussion of the various alternatives considered, listing advantages and disadvantages. Alternatives may be small structures, patterns / systemic styles, or even alternative architectures, depending on the project nature. However, alternatives should be realistic, plausible and not obvious.

Presentation and defense

The mid-term presentations will take place on April 2nd and April 9th if needed. These presentations will be held by the group, and all members must participate. You should prepare a set of slides. Slides should m included in the delivery. Presentations will last up to 10 minutes, followed by an equal period of questions.

The final presentations will take place throughout the first weeks of June on dates to be determined. These presentations will be held by the group, and all members must participate. You should prepare a set of slides that reflect the final results. Slides should must be included in the final delivery. Presentations will last up to 15 minutes, followed by an equal period of questions.

Submission

The mid-term presentation slides should be compressed into a ZIP file and submitted in Inforestudante by the 2nd of April before class.

The final presentation slides should be compressed into a ZIP file and submitted to Inforestudante by May 21st.

Evaluation

On class or on predetermined time slots on April 2nd and 9th (30%) and June (70%)

Final Notes

Please note that dates may be updated, defenses may be pushed forward but not backward.