Shared Internet-of-Things Infrastructure Platform (SIoTIP)

Part 1: Assignment instructions

The project involves the development of the SIoTIP platform as described above. In part 1 of the assignment, you will identify and prioritize **architecturally-significant requirements** (ASRs) and document them as **Quality Attribute Scenarios** (QASs).

A. Identification of ASRs and Utility Tree

Study the description of the application case carefully. Use the self-test available via Toledo to get feedback on how well you understand the problem domain.

From your understanding of the main business goals[1], make a longlist of architecturally-significant requirements that will affect the development of the described system.

Provide a short summary paragraph (1-2 sentences per identified ASR) about the nature of the requirement and the nature of the constraints imposed by them.

Structure the output in a Utility Tree, which includes an assessment of (a) the business value and (b) the architectural impact (both on a [H,M,L] scale), and shortly outline your reasoning behind this.

B. QAS Documentation

Select **four** of the **most highly ranked non-functional requirements** from the utility tree and describe them in detail as quality attribute scenarios. If they are ranked similary, try to document as many different types of *-ilities* as possible.

Adhere to the template for quality attribute scenarios[2]: (i) **Source of stimulus**; (ii) **Stimulus**; (iii) **Environment**; (iv) **Artifact**; (v) **Response**; and (vi) **Response measure**.

Format of the report Integrate the results in a coherent document. Adhere to the following structure:

- **A. Utility tree of ASRs**. Per ASR:
  - Summary paragraph (what is the requirement about?). Be short but precise.
  - Prioritization (Business value, architectural impact): shortly explain why.
- **B. Quality Attribute Scenarios**. Detailed scenario descriptions[3].

A LaTeX template containing the above structure is available on Toledo. Hand in the a printed version of the report in the dedicated project post boxes (main floor of the department of computer science, in the student printer room A00.03) and submit the digital version via Toledo. The deadline for this is **Wednesday March 06 2019, at noon**.

Good luck,
The SA team.

[1] Refer to Chapter 16.3 of the book of Bass, Clements and Kazman "Software Architecture in Practice, 3rd ed." if you need additional guidance.

[2] For more information about the format in which quality attribute scenarios are documented, refer to the book of Bass, Clements and Kazman "Software Architecture in Practice, 3rd ed.", Part 2 (Quality Attributes).

[3] An example Quality Attribute Scenario (M1) for Modifiability is presented on the next page.

1 Quality Attribute Scenario

1.1 *M1*: Integrate new sensor or actuator manufacturer

A new sensor or actuator manufacturer wants to integrate with SIoTIP. Such a manufacturer can provide pluggable devices similar to those already available (e.g. a temperature sensor measuring in degrees Fahrenheit instead of degrees Celsius) or provide completely new devices (e.g. a smoke detector). This should require minimal changes to the gateway software, data processing and storage in the Online Service.

- **Source:** A sensor or actuator manufacturer.
- **Stimulus:** The manufacturer wants to offer a new type of pluggable device supported by SIoTIP.
- **Artifact:** code, interfaces, processing and storage of pluggable data
- **Environment:** At design time or at run time
- **Response:**
  - This modification has the following consequences:
    - The new types of sensor or actuator data should be transmitted, processed and stored, and should be made available to applications.
    - The pluggable data processing subsystem should be extended with relevant data conversions, e.g. converting temperature in degrees Fahrenheit to degrees Celsius.
    - The available applications can be updated to use any new pluggable devices.
    - The infrastructure managers must be able to initialize the new type of pluggable device (cf. the use case '*Initialise a pluggable device*'), configure access rights for these devices (cf. the use case '*configure pluggable device access rights*'), and view detailed information about the new type of pluggable device (cf. the use case '*Consult and configure the topology*').
  - This modification must not affect:
    - The existing applications.
    - The hardware provided by the current sensor and actuator manufacturers.
- **Response measure:**
  - Applications should not require any code changes to use new pluggable devices equivalent or similar to one already in use.
  - Extending the pluggable data processing and storage facilities to handle any new types of actuator or sensor data should not take longer than 1 man week.
  - Application providers that develop a new application do not need to distinguish in any way between the pluggable device types that were already foreseen in the initial release of SIoTIP and the pluggable device types that were added at a later point in time.