SCRUM METHODOLOGY AND SYSTEM DESIGN

General idea

The name of our project is **ECO**. One of the most important problem that we have in the world is that of **pollution**, in particular the air pollution, which is very dangerous for both human and environment health.

The main **chemical agents** that represent a danger for the health are:

- O3
- NO
- NO2
- NOX
- PM10
- PM25
- BENZENE
- CO
- SO2

ECO will concern for the analysis of the concentration of these chemical agents in the area of the province of **Rome**, in order to provide to the competent authorities the tools to monitor the environment. Data will be acquired through the **stations** located in the area, that allow to analyse data concerning chemical agents in real time and study their relationship with complementary factors such as:

- **Weathering**
- **UV rays**

We believe that the communication between authorities and citizens is very important, so we want to introduce a tool that allows citizens to receive in a transparent and clear way **announcements** from the authorities which are in the interest of the whole community.

Also, another important tool for the system is the **alert** tool, that will allow to notify citizens for any dangerous situation in which the concentration of some of the previous cited chemical agents is above some predefined **threshold**.

Users

The system will be developed for three different kind of users:

- **Citizen** -> it is the user with less privileges, and he will be able to visualize data and receive announcements
- **Operator** -> it is the user that will be able to make announcements from the appropriate page, together with all the privileges of the citizen
- **System Admin** -> it is the user that will have all privileges, so he will be able to access the database and he will also be able to manage all the operators

Technologies

In the development of the system, there will be used different kind of **technologies**, **programming languages** and several **REST API external services**. For the **technologies** we have used:

- **REST**, which have allowed us to communicate in a synchronous way with the external services, and also among the system's containers
- **AMQP**, which have allowed us to build a notification system in an asynchronous way when some chemical agents' values were above a certain threshold
- **SMTP**, which have allowed us to send email when this was necessary

For the **programming languages** and **frameworks**, we have used:

- **Node.js**, because it allows us to use different modules for the implementation of a REST Web Service
- **Vue.js,** because it allows us to setup a Single Page Application, by also exploiting the reactive components
- **Bootstrap/Javascript,** for a correct management of the users' interactions

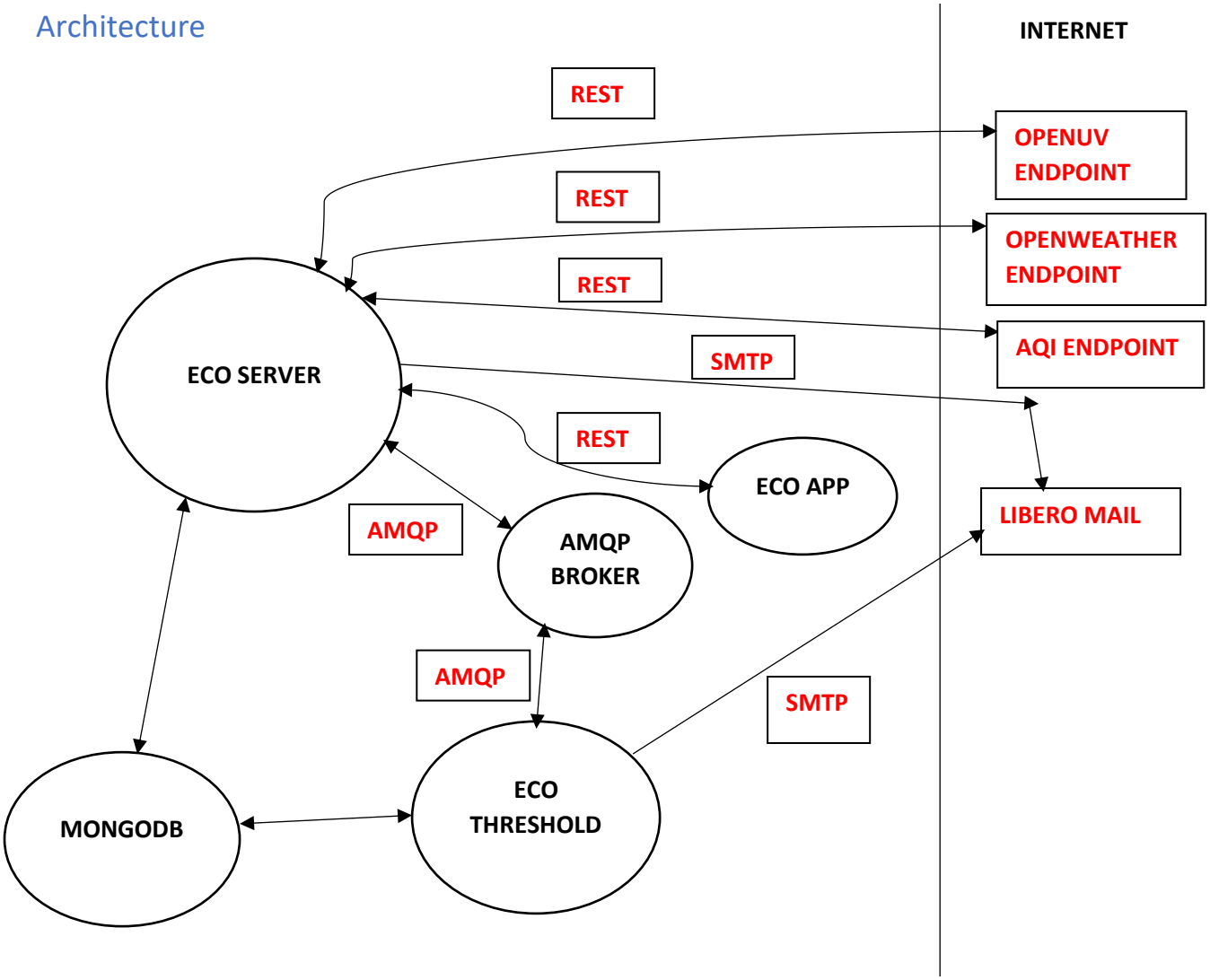
For the **REST API external services**, we have used:

- **AQI service**, for getting chemical agents data from some stations in the province of Rome
- **OpenWeather service**, for getting informations about the weather in the province of Rome
- **OpenUV service**, for getting informations about the UV rays in the province of Rome

Data will be saved and managed through a **non-relational database management system**, which is **MongoDB**.

Finally, the entire system will be deployed on **Docker**, and all the custom images will be available on **Docker Hub**.

Architecture



Each **circle** represents a different **container** of the system. In particular, our system is composed by **three main components**, and each of these three will represent a different **custom image**:

- **Eco server**, which represents the main server of our system
- **Eco threshold**, which is responsible for alerting users when there are some chemical agents above a threshold
- **Eco app**, which contains the GUI

Scrum

Each **sprint** is of the duration of **one week**. The **estimated number of days to complete the project is 25**. So, in order to complete the project, **5 sprints** were needed. Below we report details for each sprint.

Sprint 1

TASK TITLE	AMOUNT OF WORK IN HOURS			START DATE	DUE DATE	DURATION	WEEK 1				
	ESTIMATE	COMPLETED	REMAINING				M	T	W	R	F
Startup project	17	17	0								
System design	5	5	0	1/10/2022	1/11/2022	2					
System documentation	2	2	0	1/11/2022	1/12/2022	2					
System architecture	3	3	0	1/12/2022	1/13/2022	2					
User stories	2	2	0	1/13/2022	1/13/2022	1					
Documentation review	2	2	0	1/13/2022	1/14/2022	2					
Data modelling	3	3	0	1/14/2022	1/14/2022	1					

The first spring started on 01/10/2022 and finished on 01/14/2022. The goal was to create the needing **documentation** to define the foundations of the project, to define the **system architecture**, to define the use cases through **user stories** and to create the **data model**.

Sprint 2

TASK TITLE	AMOUNT OF WORK IN HOURS			START DATE	DUE DATE	DURATION	WEEK 2				
	ESTIMATE	COMPLETED	REMAINING				M	T	W	R	F
Eco Server development	32	32	0								
Chemical agents features	10	10	0	1/17/2022	1/19/2022	3					
Authentication features and db connection	8	8	0	1/17/2022	1/19/2022	3					
Meteo features and configuration files	4	4	0	1/19/2022	1/20/2022	2					
Registration and announcements features	4	4	0	1/19/2022	1/20/2022	2					
Helper functionalities and admin features	3	3	0	1/20/2022	1/21/2022	2					
Configuration update and announcements' management	3	3	0	1/20/2022	1/21/2022	2					

The second spring started on 01/17/2022 and finished on 01/21/2022. The goal was to develope the main features of the **Eco Server**.

Sprint 3

TASK TITLE	AMOUNT OF WORK IN HOURS			START DATE	DUE DATE	DURATION	WEEK 3				
	ESTIMATE	COMPLETED	REMAINING				M	T	W	R	F
Eco threshold and Eco app development	30	30	0								
Bug fixing on Eco-Server	2	2	0	1/24/2022	1/24/2022	1					
AMQP Producer	3	3	0	1/24/2022	1/24/2022	1					
AMQP Consumer and basic setup	5	5	0	1/25/2022	1/26/2022	2					
Email and support features	6	6	0	1/25/2022	1/26/2022	2					
Added basic setup Vue	2	2	0	1/27/2022	1/27/2022	1					
Added registration and login views	5	5	0	1/27/2022	1/27/2022	1					
Added dashboard components and logout	3	3	0	1/28/2022	1/28/2022	1					
Added password recovery	4	4	0	1/28/2022	1/28/2022	1					

The third spring started on 01/24/2022 and finished on 01/28/2022. The goal was to develope the main features of the **Eco Threshold**, and also to start developing the **Eco App**.

Sprint 4

TASK TITLE	AMOUNT OF WORK IN HOURS			START DATE	DUE DATE	DURATION	WEEK 4				
	ESTIMATE	COMPLETED	REMAINING				M	T	W	R	F
Eco app development and Documents review											
Dashboard and change password features and several assets	6	6	0	1/31/2022	2/1/2022	2					
Advanced features	8	8	0	1/31/2022	2/1/2022	2					
User stories booklet	6	6	0	2/2/2022	2/4/2022	3					

The fourth spring started on 01/31/2022 and finished on 02/04/2022. The goal was to finish developing the main features of the **Eco App**.

Sprint 5

TASK TITLE	AMOUNT OF WORK IN HOURS			START DATE	DUE DATE	DURATION	WEEK 5				
	ESTIMATE	COMPLETED	REMAINING				M	T	W	R	F
Documents review											
FP + Cocomo 2 booklet	5	5	0	2/7/2022	2/8/2022	2					
Scrum and design booklet	7	7	0	2/8/2022	2/10/2022	3					
Slide for presentation	4	4	0	2/11/2022	2/11/2022	1					

The fifth spring started on 02/07/2022 and finished on 02/11/2022. The goal was to create all **required documentation**.

Burndown Chart