INM429 Cloud Computing

Coursework - Specification of Application

Group PG5

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Description of the cloud application:

Our project goal is to create an internet of things application. The developed software will be deployed on Google Cloud Platform and single board computers Raspberry Pi. The main purpose of the application is an online remote control of the devices via a web user interface that are electronically connected to Raspberry Pi (e.g. heaters or lamps). The system will be used mostly by geeks and hobbyists with interest in electronics and embedded systems.

The users will be required to install our application for Raspberry Pi and register the device to the system. After this process they will be able to connect the Raspberry Pi to our cloud service and use a web user interface for a remote control of the devices attached to the Raspberry Pi.

We are aiming to deploy the system on a simple cloud configuration, but if our progress is fast enough, we will implement some extra features in order to learn more about clouds computing. We can apply autoscaling, load balancing, undertake some stress tests, collect data about performance and evaluate the results.

The architecture of the application and programming languages:

Such project can be successfully finished using different approaches. We have chosen the Google Cloud Platform, a powerful set of cloud-based services with a variety of development tools.

The figure 1 is showing a simplified block diagram of the proposed specification. The web server and the communication server will be created using 2 VM instances that are available on Google Compute Engine (infrastructure as a service). The web server will apply Apache Tomcat, Java servlets and Ubuntu operating system. This server is potentially suitable for autoscaling. The web page code is going to be written in HTML, CSS and Javascript. Subsequently, one Ubuntu VM will be created to communicate with Raspberry Pi devices using our Java application.

Another part of the system is Google Cloud SQL, a platform as a service that delivers fully managed mySQL database which boosts productivity of developers by elimination of time consuming tasks such as updates or backups. These operations are undertaken by Google.

Finally, user's Raspberry Pi will run our Java client application that must be able to secure the communication with the server, process commands and control hardware outputs of the microcontroller Broadcom BCM2836 using Pi4J open source library. The application will be tested on Raspbian operating system (Debian distribution optimized for Raspberry Pi).

Distribution of work:

Ludek Navratil: communication server app, Raspberry Pi app, MySQL database
Awais Azeem: web server application, web page
Both : possible extra features - autoscaling, load balancing, stress tests

Figure 1: Simplified block diagram of the system

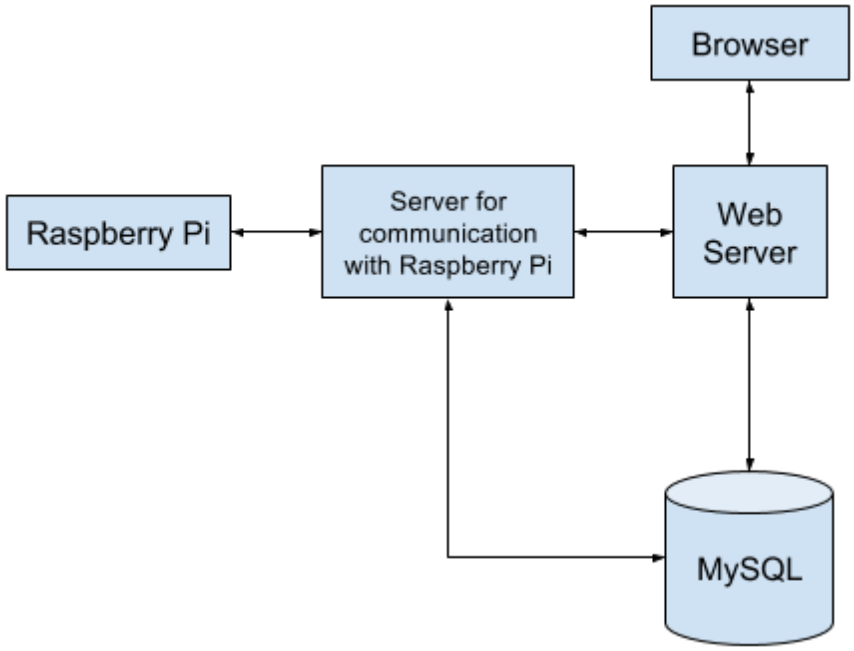

Figure 2: MySQL database design