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Code layout readability
reusability

1.1 Background

The next wave of in the era of computing will be more advanced when compared with traditional system. In the Internet of Things (IoT) perspective one can understand that it is connecting the objects that surround us will be on the network in one form or another sensor network technologies will rise to meet this new challenge, in which information and communication systems are invisibly embedded in the envi ronment around us. Connecting the embedded devices to internet is evolution as it plays a dual role for both hardware as well as in software technology where the duo logy hold the key role and makes us to call the things which are connected to internet, For better utilization and making things more interactive makes these system objective as main achievement in Internet of Things where data from the things acts as fuel to these technology on software side so when we talked about the data these embedded devices either offline or online generates the data, so generating the data offline is of no use in IoT level so the technical stuff behind the hardware and software should sync one another in order to generate the efficient modelwhen This results in the generation of enormous amounts of data which have to be stored, processed and presented in a seamless, efficient, and easily interpretable form. This model will consist of services that are commodities and delivered in a manner similar to traditional commodities. Cloud computing can provide the virtual infrastructure for such utility computing which inte grates monitoring devices, storage devices, analytics tools, visualization platforms and client delivery. The cost based model that Cloud computing offers will enable end-to end service provisioning for businesses and users to access applications on demand from anywhere so connecting those to internet have a significant effect to send the data to

1.2 Problem Statement

IoT can be called as smart connectivity in which the embedded devices are connected to internet to make the data available to the user whose is authorized. As we can see our day to day application where RFID system is being lised is in libraries every book will be having the RFID tag so that it will generate an alert to the authority when the book has been robbed without registration from the RFID identifier. How ever, for the Internet of Things vision to successfully emerge the computing paradigm will phones and portables, and evolve into connecting everyday existing objects and embedding intelligence into our environment. For technology to disappear from the con sciousness of the user, the Internet of Things demands: (1) a shared understanding of the situation of its users and their appliances (2) software architectures and pervasive communication networks to process and convey the contextual information to where it is relevant, and (3) the analytics tools in the Internet of Things that aim for autonomous and smart behavior. With these three fundamental grounds in place, smart connectivity and context-aware computation can be accomplished,

1.3 Motivation

The main purpose of the thesis is to investigate and research the IoT concept and get a solid understanding of the concepts together with its difficulties, problems and the ability to be used in real world applications. The term Internet of Things was first coined by Kevin Ashtonin 1999 in the context of supply chain management. However, in the past decade, the definition has been more inclusive covering wide range of ap plications like healthcare, utilities, transport, etc. Although the definition of Things has changed as technology evolved, the main goal of making a computer sense infor mation without the aid of human intervention remains the same. A radical evolution of the current Internet into a Network of interconnected objects that not only harvests information from the environment (sensing) and interacts with the physical world (actu ation/ command/control), but also lises existing Internet standards to provide services for information transfer, analytics, applications, and communications. Fueled by the prevalence of devices enabled by open wireless technology such as Bluetooth, radio fre quency identification (RFID), Wi-Fi, and telephonic data services as well as embedded

1.4 Aim And Objective

The quantity of data being collected and analyzed in and through the IoT will be huge. No one can predict this ginormous data volume reliably, but we frequently see articles that mention zettabytes, yottabytes,brontobytes, and even as high as geopbytes. For example: it is already true that sensors on a single Boeing aircraft jet engine can gener ate 20 terabytes of data per hour; the future astronomy optical telescope LSST (Large Synoptic Survey Telescope) will produce about 200 petabytes of data in its survey life time; and the future astronomy radio telescope ensemble SKA (Square Kilometer Array) will alone produce several exabytes per day as it senses the changes and behaviors of objects in the Universe. The Universe so, maybe we really are building the Internet of Everything after all. Each of these examples corresponds to one single node out of the billions (or trillions) that will be collecting and delivering data through the IoT. Those are huge devices, whereas most devices on the IoT will be small (e.g., your home thermostat, your car tires, your toaster oven, and everything else).

Now consider that IoT represents the next evolution of the Internet, taking a huge leap in its ability to gather, analyze, and distribute data that we can turn into information, knowledge, and, ultimately, wisdom. In this context, IoT becomes immensely important. Already, IoT projects are under way that promise to close the gap between poor and rich, improve distribution of the worlds resources to those who need them most, and help us understand our planet so we can be more proactive and less reactive. Even so, several barriers exist that threaten to slow IoT development, including the transition to

visualizations to lisers,

Sensor

Dala

App Engine,
Google Cloud
Datastore &
Task Quotes

Google
Compute
Engine

Google

Cloud
Storage

Google
BigQuer
y

FIGURE 1.1: Architecture of pushing data to
GAE

1.5 Challenges

Several barriers, however, have the potential to slow the development of IoT. The two main challenges are the deployment of IPv6, power for sensors, and agreement on stan dards

1.5.1 Deployment of IPv6:

The world ran out of IPv4 addresses in February 2010. While no real impact has been seen by the general public, this situation has the potential to slow IoTs progress since the potentially billions of new sensors will require unique IP addresses. In addition, IPv6 makes the management of networks easier due to auto configuration capabilities and offers improved security features.

1.5.2 Sensor energy:

For IoT to reach its full potential, sensors will need to be self-sustaining. Imagine changing batteries in billions of devices deployed across the planet and even into space. Obviously, this isnt possible. Whats needed is a way for sensors to generate electricity from environmental elements such as vibrations, light, and airflow

1.6 Essence Of Approach

1.6.1 Arduino yun

Arduino is an open-source physical computing platform based on a sim ple I/O board and a development environment that implements the Processing/Wiring language. Arduino can be used to develop stand-alone interactive objects or can be

connected to software on your computer (eg. Flash, Processing, MaxMSP). The open source IDE can be downloaded for free (currently for Mac OS X, Windows, and Limix). Arduino Yun is the first member of a new groundbreaking line of wi-fi products com bining the power Linux with ease of use of Arduino. The first Arduino Yun is the combination of a classic Arduino Leonardo (based on the Atmega32U4 processor) with a wi-fi system-ona-chip running Linino (a MIPS GNU/Linux based on OpenWRT). Ar duino embedded the Linux machine directly on the PCB of the Arduino Leonardo and connected the two so that from Arduino its very easy to run commands on the Linux side and use it as an Ethernet and wi-fi interface.

1.6.2 Protocols

This is one of the main part for sending the data we use HTTP protocol to send to cloud data store where the default data from arduino which will be sent is string data after that when app engine consume the data from arduino it will con vert into reqired data-type so main thing to be considered is pushing the data using internet communication by using HTT protocol. NQTT: The MQ Telemetry Transport, (MQTT) protocol is a lightweight publishi/subscribe protocol flowing over TCP/IP for remote sensors and control devices through low bandwidth, unreliable or intermittent communications. This protocol is developed by IBM and presently they are using it in Ibm blue-mix IOT foundation. This protocol is very light weight protocol where there will publisher and subscriber and broker which acts as a middleware. With respect to the above protocols the arduino yun board will be able to send the data to any server specified URL. In case of MQTT we need 119e port with respect to URL also.

1.6.3 Google Cloud Platform

Google Cloud Platform, which provides the software backend for this project, has a variety of features for building applications that collect and process data from a large number of client devices - without having to spend time managing hardware or infrastructure. Google App Engine Datastore, along with Cloud Endpoints, provides a scalable front end API for collecting data from devices. Google Compute Engine is used to process and analyse data with software tools you may already be familiar with, such as R and Hadoop. Google BigQuery provides fast aggregate analysis of terabyte datasets. Finally, App Engine's web application framework is able to surface interactive