ROLE OF WEB SERVICE IN INTERNET OF THINGS

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Abstract: The Internet of Things enable the next wave of real life services in the physical world across many sectors.Many work has been going around the theoretical implementation of Internet of Things. No work has been done to specify the impact of web service on IoT. The current paper clearly specifies the rolethe web service can play in the future of Internet of Things.

Keywords— Internet of Things(IoT), IoT Services,Web Service.

I. INTRODUCTION

Gubbi, Marusic, Palaniswami [3] defines the internet of things for smart environment as the "Interconnection of sensing and actuating devices providing the ability to share information across platforms though a unified framework, developing a common operating picture for enabling innovative applications. This is achieved by seamless ubiquitous sensing, data analytics and information representation with cloud computing as the unifying framework". The future lies in the ubiquitous sensing of devices in a communicating actuating network create the Internet of Things. All the devices such as biological, physical, chemical or mechanical are equipped with a sensor to communicate in the web. With the invention of the new device to device communication technology, the internet usage will surpass the mobile and computer.

Service Computing is neatly handled by S.P.Muninder [7] and refers it as a flexible computing architecture that packages functionality as a suite of interoperable routines that can be used within multiple, separate systems from several business domains. Service computing requires loose coupling of services with operating systems, and other technologies that underlie applications. All the functions are separated into distinct self-describing services and they are made accessible with the use of interfaces over a network. It allows the users to combine and reuse them during the service computing time. These services communicate with each other by passing data in a well-defined, shared format, or by coordinating an activity between two or more services.

Matjaz. B.Juric [6] described about the process specifications and different modes of specification in the article released by the Oracle Corporation. The service-oriented computing involves loosely coupled activities among two or more autonomous business partners. Web services communicate with other predefined web service in two modes. Either Orchestration or Choreography method is used for the composition of services.

Shayani Chakraborthy [] describes on the role of SOAP and REST on the Internet of Things. The devices that are connected on to the web have to communicate together. All the devices are from different data formats and they need a program to read and to perform an action. If the data follows a common format, all the clients can use this data to procees the request. This is where the web service comes into play. By understanding the future of the web service on the IoT, the author gives a short survey of the two specifications of the web service as SOAP and REST. He listed out the advantages and disadvantages of the above approach. He concluded that one has to choose between SOAP and REST based on the programming language, environment and the application requirements.

II. BASIC DEFINITIONS

Internet of Things (IoT): The Internet of Things refers to the use of intelligently connected devices and systems to leverage data gathered by embedded sensors and actuators in machines and other physical objects. The Internet of Things is about the business insights gathered by collecting and the processing of the collected data. The growth of sensors, internet connectivity, web service technology, cloud computing contributes to the growth of the IoT from mere definition to reality.

A. Web Service: Web service is defined by a URL whose definitions, interfaces and their bindings are specified using XML. Web service uses XML for data representation and data transportation between layers. XML eliminates networking, operating system and platform binding. Web service based applications are highly interoperable application at their core level. A Web service is a software system designed to support interoperable machine-to-machine interaction over a network. It has an interface described in a machine-processable format. Web service interacts with other systems prescribed by its description using Simple Object Access Protocol messages; they conveyed the message using HTTP with XML serialization in conjunction with other Web-related standards.

XML: XML is touted as an external format for representing the data. Xml is a standard for describing

documents by the World Wide Web Consortium. XML is protocol and language independent. The xml syntax is not predefined. User can create his set of syntax. XML forms the core part of the web service. All the messages to and from the web service is in the form of XML.

WEB SERVICE ARCHITECTURE

Web Service is a computing technology that offers better communication among many applications, across many platforms, languages and in business. Web Service is a software application and they are called using a URI, and all the bindings and interfaces are discovered, described and identified using the XML messaging system. web Service is a part of the service oriented computing that provides a computing platform to coordinates among many business platforms, business and applications. They are independent software applications called as services and they are available in the web and can be accessed with the help of XML, SOAP, UDDI, WSDL. Most popularly and widely accepted web services are SOAP-based web service and RESTful Web Service.

Database access by means of internet or intranet is very easy with the deployment of the web technology. There arise situations where, the client request for information and the internet or database s not open or the queries. Web service can possibly help us in this regard. The web service can create a client application; can invoke the web service and the data to the client. The corresponding data or copy can be send to the corresponding client at the time of the local network disconnection time. Web service is the commonly used protocol to interact with other system components. They can interact using the SOAP protocol via the HTTP protocol and is purely based on the XML to the access the service on the web. Figure 1 describes the web service architecture.

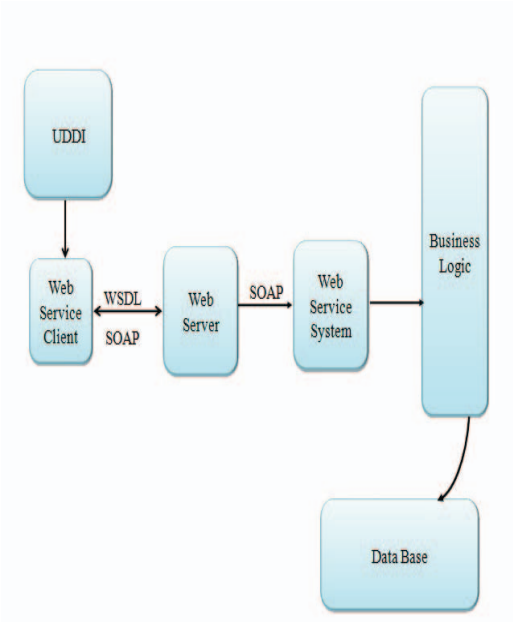

Fig.1 : Web Service Architecture

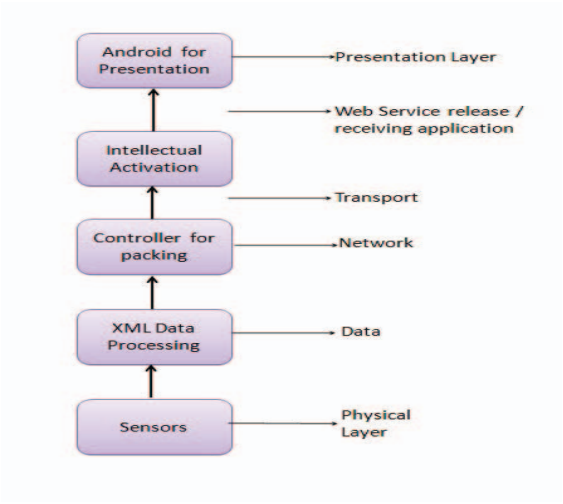

Fig 2:Work Flow in IoT

WORK FLOW IN IoT

The data have to be collected from the sensors using different type of sensors available in the market based on the device. This data have to be converted to a universally accepted data format for its processing across the web. it has to be packed with suitable destinations and then placed in the web. All the data have to be in the cloud for its immediate access. There must be programs to easily access this data and to reply to the client. If the program is in the cloud, we can have the timed accessibility. After the processing, the result will be send to the user

The working of the Internet of Things can be compared to

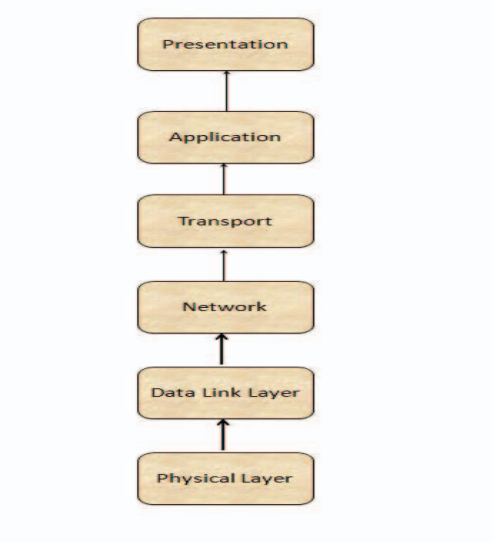

Fig.3 : OSI model for IoT

the network model for its implementation. It is neatly explained in the next section.

INTERNET OF THINGS AND ITS LAYERS

Internet of Things can be summarized into seven layers. First one is the physical layer, second one is the data layer, third one is the network layer, fourth one is the transport layer, fifth one is the application, sixth layer and the seventh is the presentation layer. Thus it can be mapped to the OSI layers. The overall function of the seven layer contributes to the working of IoT. Figure3 shows the OSI model for IoT.

Physical Layer: All the sensors are connected to the network. Internet of Things need that data to work and all the data have to be collected at the time of its occurrence. Sensors do this job. Sensors can be a biological sensor, fire sensor, temperature sensor or a current sensor. The sensors collect the data based on its voltage or instant variations.
Data Layer: Data collected by the sensors are not a universally accepted data format for all the languages, software or platforms. This has to be converted to XML. This layer takes care of this conversion and that is attached to the sensor or a local controller.
Network Layer: All the collected information has to be to be packed to the controller for its transfer over the web using the wired or wireless technology. Only the information that has been triggered by the sensor has to be packed by this layer to its destination.
Transport Layer: The XML data is transferred to the web in this layer. There are two transmission modes in this layer. It can be wireless and wired transmissions.
Application Layer : Application Layer is to create interfaces, to find the accurate web services and to do the appropriate action like data base access, cloud access and the management access. The results are collected and send to the next layer.
Presentation Layer : The actual data or result is published in this layer. It can be for smart home automation, health care, medical automation or a smart city.

ROLE OF WEB SERVICE

What is the role of web service? Where we can place the web service in IoT? We have clearly explained the work flow. In order to process the data from the sensor, execution of the business logic, database access and the reply to the user, there arise a need for the service. When the service is published in the registry for any type of access like a general web service for home automation, smart city, health care the user can access the resources with the service available in the registry. We have a generalized service available in the cloud for any IoT devices to handle the data relating to medical, device, defense etc.

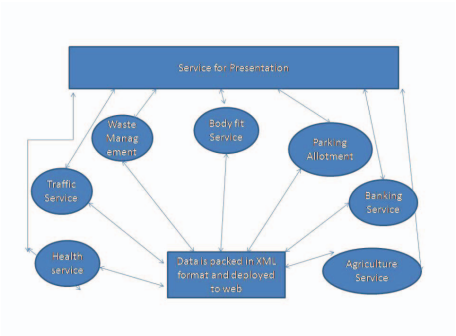

Fig.4 : Web Service in IoT

Based on the data and the values and the need of the user, the system can use any of the service available in the market for its processing. After the processing by the service, the result will be directly given for presentation.

CONCLUSION

The role of web service on the Internet of Things has been clearly explained. All the services that can be given to the user can be constructed as a general service and this service can be called for its processing. So many processing execution language for the computation of different service are available as business process execution language. with the help of this language result will be provided to the user after a series of service computations.

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