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Cross- Domain Devices Interoperability

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Abstract:

We describe a case study of the behavior of four agents using a space based communication architecture. We demonstrate that interoperability may be achieved by the agents merely describing information about themselves using an agreed upon common ontology. The case study consists of an exercise logger, a game, a mood rendered attached to audio player and phone status observing agents. The desired scenario emerges from the independent actions of the agents.

1. INTRODUCTION

This research has striven to describe interoperability among cross domain devices. IoT connects all devices to the internet, so they are able to communicate and exchange information, services. Our principal interest is to analysis different interoperability frameworks that bring all the devices together and provide them a platform to communicate.

M2M is one way of communication between machines. IoT applications do not interpret data, as they are domains specify and not interoperable due to different set of concept in domain area, domain experts do not share it publically [1].

Section 2 contains reviews of pervious papers. In section 3 we designed table – IoT, Cloud Computing and Interoperability as variables and different effecting factors are described which gives easy understanding.

A. Cloud Computing

Cloud computing is basically a concept of providing services over the internet. Services include storage, software, databases, servers etc. Basic architecture of CC consists of three layers of services provided by cloud venders. SaaS (Software as a Service), PaaS (Platform as a Service), Infrastructure as a Service).

B. Internet Of Things

IoT is a conceptual system that inter-relates those things which are connected to internet and provides them the ability to share informative data without any human help. Internet of Things moves traditional environment towards smart environment such as: smart houses, smart cities, smart cars etc. Now days there are many solutions that interconnect home appliances to communicate [2].



C. Interoperability

Interoperability allows systems or applications to share information in meaningful way. The information which is shared you can not only read or write but you know why the information was shared.

2. BACKGROUND

Our research is basically about reviewing different methods of multiple domain interoperability. For this purpose we studied approaches that allow things to connect, share data and services.

3. LITERATURE

A lot of work is being done in this area around the world. We have studied several research works done in this same field. A few of them are mentionable on the basis that they are related to IoT and interoperability.

Orestis Mavropoulos et al discussed about the security issue in IOT system. As IOT is one of the most wanted interconnected devices network now days, that connects different devices and enable communication between them. Anything connected to the internet must have security issue. Authors proposed a conceptual model “APPARATUS” for IOT security which is architecture oriented model and considers IoT system as cluster of connected networks (nodes) [3].

Another research has been done by K.E Psannis has well described about limitations of IoT, Mobile Cloud Computing MCC, advantages of MCC and MCC in business [4].

Amelie et al have gently described the importance of semantics and its integration with IoT based architectures. They work hard and designed semantic engine which can help to integrate different constituents of IoT architecture such as: Cloud, smart phones and machine to machine gateways [5].

4. METHODOLOGY

Information about topic is collected through literature approach. This method focuses on review of documents and describes problem.



Sr #	Variables	Effecting Factors					
		Diff. Platforms	Diff. Equipment's	Diff. Versions/Time Of Purchase	Diff. Operating Systems	Diff. Protocols	Diff. Programing Languages
1	IOT [6-11]	Hardware / Software both lies on platform. Thus, platform is so called a combination of Hardware and Software. Platform might be a stage of specific hardware / software, each device has their own platforms which defers from each other.	Equipment's are used in device for a specific purpose. Every device has their brand equipment's.	IOT includes devices all over the universe. People buy them, company's purchase them, all are not purchase at the same time, thus version of device also change with the time [12-19].	All devices which connect to the internet are IOTdevice. Those devices don't use same OS.	Protocols are used for communication purpose in between IOTdevices. Some relies on TCP/IP, some on UDP etc.	Java, C, Python, JavaScript, Swift, PHP, C#.
2	Cloud Computing [20-28]	Many platforms are provided by cloud vender; out of which three are the main platforms. Software as a Service (SaaS), Platform as a Service (PaaS), Infrastructure as a Service (IaaS). All of the above are On-Demand Service / Pay as go – per usage.	Distributed data centers are the combination for many Servers, Routers, and Switches etc. Each of them consists of different equipment's depend upon the requirements.	Hardware / Software are not purchase for server rooms at the same time. If required so they are purchased. E.g. data storage space decreasing so vender will purchase a new storage. Purchase date / version will be change.	Cloud computing at the backend is the combination of distributed data centers, consists of many servers, switches, routers etc. All of these have their own separate operating system.	Gossip protocol use for failure detection, messaging, monitoring. Connection less n/w protocol. State Routing Protocol SRP etc.	SQL, Oracle for Database. Go procedural language created by Google. GFM domain-specific language and many more.
3	Interoperability [29-34]	Computers, mobiles, tablets, sensors, wrist watch, MACbook,	RAM, ROM, storage devices, smart	Purchasing time will should not affect the inter communication	Microsoft, MAC, Linux, Unix, Android,	Interconnectivity between different	Different languages can communicate through cloud but



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	iPod, smart watch, IP cameras etc.	touch screen, 3D touchscreen, mic, monitors, camera lenses etc.	between device unless the latest version supports previous versions [35-42].	IOS.	devices through internet using separate protocols.	there should a combine storage, rather than even single device having separate language or OS will have separate storage e.g. icloud and android backup.
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Table: Effecting Factors Comparison

5. CONCLUSION

The main novelty and contribution of this paper is that IoT integrates devices through network capabilities. More IoT applications need to be design with built-in frameworks that allows different device to share same platform and give easiness to communicate. Great development in the technology, IoT and device interoperability is highly demanding in industries.

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