Internet of Things: Rule Based Event Management

Shobhit Shukla[1], K. Sornalakshmi[2]

[1]M.Tech Cloud Computing, Department of Information Technology, SRM University, SRM Nagar, Kattankulathur, Tamil Nadu, India, 603203

[2]Assistant Professor, Department of Information Technology, SRM University, SRM Nagar, Kattankulathur, Tamil Nadu, India, 603203

Abstract: *This research paper focuses on the rule based management of the events generated during function of Internet of things (e.g. Smart Devices). These smart devices generate events during the course of action, and the need of managing these events has evolved the genesis of Rule based engine. This rule based engine will receive the events data as an input and as per the rules set it will give a feedback to the user about the next course of action. Various devices such as mobile phone, a tablet, a fridge, car, or computer can send data and user can get insights from that data. A close connection between things and humans, the cyber world and the physical world, has thus been established via sensors and devices. And that is why the potential for transformation is immense. Every industry will create new business models and offer new services to customers with the Internet of Things; and managing these devices with a rule based engine will be sanctum- sanctorum of the Internet of Things.*

Keywords: Internet of Things, Business Rules, Bigdata, Cloud Computing, If-Then rules.

1. Introduction

The world is going under a big transformation. It is notable that the there is a rapid transition from isolated devices to the internet enabled things called as *Internet of things- IoT*. These IoT are capable of generating huge data, by processing these data and collecting insights will help in improving the overall productivity of business, a better governance, a safer manufacturing plant and everything which is related to human eco system. The Internet has been in existence for over forty years and the term 'Internet of Things' has been in use since the large scale adoption of RFID began a decade ago. So what is creating this new excitement about IoT? There are several factors. Today you have low cost but highly capable sensors, and advances in wired and wireless communication technology and network protocols that permit you to better connect sensors to the Internet. You have an array of tools, platforms, and analysis techniques that can process large amounts of sensor data and present meaningful insights. These meaningful insights help every business to achive the desired growth, safety compliances and better user experience.

An IoT platform should be able to let you plug in different devices and manage them remotely. Whether you are tracking a valuable asset on your shop floor, a wearable healthcare device, or a vehicle, you will need to configure the device and run firmware upgrades. You should also be able to work with the various software applications that relate to the device. You should be able to ensure device security and access to stakeholders. The platform must also permit you to monitor the device's connectivity and health, and run reports. From a functional standpoint, data collection from IoT devices is extremely important. Data from the device may be collected or queried periodically, on-demand, on a scheduled basis or based on 'events'.

by enabling billions of systems across the globe to share and analyze data over the cloud. With these capabilities, IoT solutions can improve medical outcomes, create better products faster, lower development cost, make shopping more enjoyable or optimize energy generation and consumption. Moving forward, nearly every device will need built-in, secure, interconnected intelligence. Similarly, the supporting network and cloud infrastructure must be enhanced to better protect data, manage devices and perform data analytics.

In an IoT world there will exist a vast amount of raw data being continuously collected. It will be necessary to develop techniques that convert this raw data into usable knowledge. For example, in the medical area, raw streams of sensor values must be converted into semantically meaningful activities performed by or about a person such as eating, poor respiration, or exhibiting signs of depression.

Explosive growth of smartphones and tablet PCs brought the number of devices connected to the Internet to 12.5 billion in 2010, while the world's human population increased to 6.8 billion, making the number of connected devices per person more than 1 (1.84 to be exact) for the first time in history.
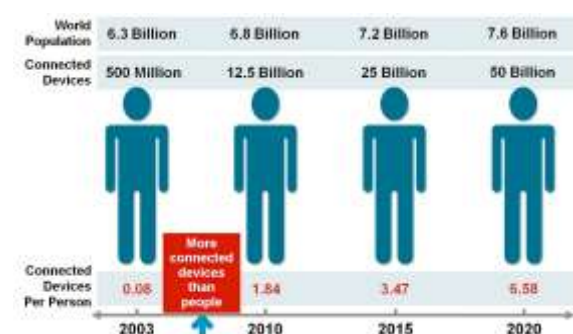

2. Literature Survey

The IoT vision is to create opportunities to transform businesses, people's lives and the world in countless ways

3. Approach

The world of things consists of connected devices (edge devices) that are connected either directly or indirectly to a

Paper ID: SUB153249

1214

back end via local gateways. The world of IT consists of an IoT platform and the applications built upon it. This means that the IoT platform functions as middleware between the physical and IT world, facilitating the development of IoT applications and solutions. Only once these two worlds have been joined, including the necessary connectivity, does the value chain in the Internet of Things become complete.
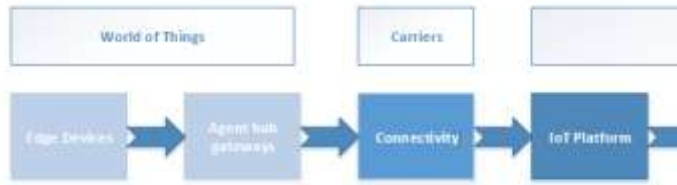
When we refer to "process and integration logic", we mean the sequence of individual process steps and the definition of points at which users have to to be actively involved or third-party systems integrated. This logic can be set up by business users thanks to our intuitive, model-based approach. Afterward, they can quickly and easily implement technical workflows in cooperation with their IT department.

To map the business logic within these processes in the best way possible, users can define rules that enable decisions to be made as part of the process sequence. The management of devices as well as the use of the data they provide can similarly be mapped within the processes.

There are more reasons why efficient rule management is particularly important for the IoT. Rules can manage many different variables (tax rates, sales quotes, technical thresholds, etc.) that could greatly affect applications. It follows that modifying those rules offers a fast and easy way to change the variables. Doing so allows companies to shorten their time to market considerably.

The interrelationship between rules and variables also provides a solid foundation for the collaboration of IT specialists with business or other experts. If rules are provided as graphical metaphors, business departments can flexibly integrate industry know-how into application development and manage their rules themselves. This way, they can automate a huge number of operational decisions – without any programming knowledge.

4. Results

The Business Rules enables developers to spend less time recoding and testing when the business policy changes. The Business Rules minimizes your code changes by keeping business logic separate from application logic. It can be valuable hosting decisions here with cloud based applications.

Advantages of Rule Engines:
1) Greater flexibility: keeping your rules into a Knowledge base let you adapt easily your decisions when they are changing.
2) Easier to grasp: Rules are easier to understand than procedural code so they can be effectively used to bridge the gap between business analyst and developers.
3) Reduced complexity: When embedding lots of decision points to your procedural codes it can easily turn your application into a nightmare. On the other hand rules can handle much better increasing complexity because they use a consistent representation of business rules.
4) Reusability: By keeping rules are kept in one place leads to a greater reusability of your business rules. Also, traditional procedural code often impose unnecessary variations of base rules which are therefore more difficult to reuse in other contexts.

5. Conclusion

Just as the internet has transformed businesses and lifestyles in the last twenty years, IoT will disrupt your organization's relationship with its stakeholders. While it is complex, and poses some risks and is still evolving, many pioneers have started adopting this technology. A technology agnostic platform that enables device management, application management, and sensor data management with analytics will jumpstart your engagement with cyberphysical systems. The analytics and data generated will be further pushed to the Rule based engine for the events generation will increase the accuracy and boost overall productivity of the IoT. This can help you innovate new processes and initiatives to increase your organization's business performance, and create customer delight with new products and services.

6. Future Scope

IoT report situations in the form of events, which carry not only domain specific data such as current temperature, energy consumption or health of a system. They also provide context information such as timestamp, location, ownership, historic data leading to a situation and sometimes even outage and failure of the system itself. Due to the sheer mass of incoming events in a fully connected world, it is impossible for humans to make interactive decisions on a manual basis. Automated rule-based event management is the key in this world of IoT. More advances on Rule based event engine will help correlate the complex events and consequently generating the better IoT eco system and its usage.

References

[1] Prateep Mishra, ArpanPal, BalaMuralidhar P, Sandeep Saxena, Sripriya R, "Unlocking the Value of the Internet of Things(IoT) – A Platform Approach". Availale at :

http://www.tcs.com/about/research/resources/Pages/Internet-of-Things-Platform-Approach.aspx

[2] Intel solutions for IoT, white paper on "Developing Solutions for the Internet of Things"Available at : www.intel.com/iot

[3] John A. Stankovic, Life Fellow, IEEE, "Research Directions for the Internet of Things".

[4] Dave Evans, Cisco Internet Business Solutions Group (IBSG), white paper on "The Internet of Things-How the Next Evolution of the Internet Is Changing Everything".

[5] BOSCH Invented for life- white paper on "The Bosch IoT Suite: Technology for a ConnectedWorld".

[6] BOSCH Invented for life- white paper on "Realizing the connected world – how to choose the right IoT platform".

[7] Blog - Operational Decision Manager –IBM. Available at: https://developer.ibm.com/odm/blog/

[8] IMS Voyager Rules Engine, Available at : http://oldsite.imscart.com/wp-content/uploads/2014/04/Rules-Engine.pdf

[9] BOSCH Invented for life - Bosch ConnectedWorld Blog. Available at : http://blog.bosch-si.com/categories/technology/2012/04/new-video-rule-based-event-management-in-the-internet-of-things-and-services/