**Birla Institute of Technology & Science, Pilani**

**Software Architecture**

**2019-20 Semester 2**

**Non-specific program**

**Assignment #2**

**Mar 23, 2020**

**Introduction**

Each group is assigned one case as given below. Each group should work as a team, discuss different aspects of the assignment and complete the assignment. Each group should prepare one common PPT file and upload. Do not submit individual files.

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| --- | --- |
| **Group #** | **Case** |
| 1-43 | Blue Star |
| 44-86 | ECom Express |

**Objective**

To gain practical experience in designing the architecture of a systems.

**Activity**

1. Identify top 3 Architecturally Significant Requirements (ASRs) and explain why these are architecturally significant. [3]
2. Describe in detail, the tactics you recommend for each ASR. [3]
3. Draw the following diagrams:
   1. Context diagram [3]
   2. Module decomposition diagram [5]
   3. Component & Connection diagram [5]
   4. Deployment diagram [5]
4. In the C&C view, indicate important messages exchanged between components. Also indicate the communication method used. [3]
5. Describe the working of the system. [5]
6. State the architecture patterns used. Explain, where in the architecture, these patterns have been used. [3]
7. What did you learn by doing this assignment? Mention 3 key learnings. One slide per person.

Marks : 35

Weight : 10%

**Due date : April 18, 2020**

Format : PowerPoint (PPT)

Max file size : 10 MB

**Note:**

* Submit only one file per group in Taxila (eLearn Portal)
* Mention the participant names on first slide
* Every participant should click on the ‘Submit’ button
* Participants who do not discuss with their respective group members, will not get marks
* Participants who do not contribute towards the assignment, will not get marks.
* Participants who do not provide key learnings slide as part of the group submission slide-deck, will not get any marks
* Participants who do not click on Submit button, will not get marks
* Copying of any nature will be dealt with very strictly.

**Evaluation criteria:**

1. Easy-to-understand diagrams
2. Clarity of description
3. Correctness of work products

**Blue Star: Remote monitoring & control system**

Blue Star is a leading air conditioning and commercial refrigeration company with an annual revenue of over 510 million USD. They improved customer satisfaction by reducing downtime of equipment using a remote monitoring and control system to detect abnormal functioning and then proactively fixing them.

**Business case**

Blue Star carries out maintenance and break fix services across the country. Previously, whenever a problem was reported, technicians from the nearest branch or dealer used to travel to the customer location to identify, diagnose and initiate remedial work. In some cases, the travel time could take as long as 10 to 12 hours, depending on availability of the nearest technician. Consequently, the operation was both costly and inefficient.

**Approach**

While looking for a comprehensive customer service delivery management solution, Blue Star created a mechanism to securely connect all HVACs (heating, ventilation, and air conditioning equipment) with a cloud server, and integrate machine and sensor data with core business processes and applications. The result was ‘rView’ - remote monitoring and control system, which was best suited to their needs.

The GPRS-based information transmission technology helped the company to remotely monitor its equipment and technicians from a central command center.

Based on the data acquired, the team can also predict the complaints that might arise due to the abnormal functioning of the equipment and also help in providing tips to the customer to improve the functioning of the equipment. “We can now send online alerts to customers as well as the service engineers to notify them about any issue in the system, which in turn helps in ensuring timely resolution of any problem.” says Suresh Iyer, CIO of Blue Star.

The transformed system is also used to provide other services such as energy management, billing-by-usage, product performance reports for sales and customers, and product quality check for R&D and manufacturing.

**Benefits**

Some major benefits include lower labour costs, prolonging equipment life, preventing unplanned downtime, and more.

**Ecom Express: Mobility helps Ecom Express solve last mile delivery challenges**

Ecom Express is an end-to-end logistics solutions provider to the ecommerce industry. It acts as a delivery agent for e-commerce companies, picking items from e-commerce company’s warehouses and finally delivering the items to the end customers. During the journey the items pass through pickup-processing centers, destination hubs, delivery centers before finally reaching the end customer. It currently has 20 pickup-processing centers, close to 60 destination hubs and 1800 delivery centers spread across the country.

The company overcame the challenges of manual processes while driving efficiencies through mobility solutions. They developed a mobile app called SATHi which helped Ecom Express get real-time order delivery updates and save INR 2.8 million annually.

**The business case**

It was difficult to get real time updates of orders being delivered to end-customers from the delivery associates on-field (delivery boys).

It was also a challenging task for employees to maintain a lot of paper work - beginning from run-sheet generation (sheet containing information about what packages need to be delivered & where) to submitting of the cash reconciliation and delivery reports. A lot of time was spent on the admin work.

Moreover, it was difficult to estimate the amount of cash that an associate (delivery boy) had collected against payment for cash-on-delivery shipments. Since everyday remittance of cash is a crucial part of Ecom Express’ business, the unavailability of ready information with regards to cash collection was always a source of concern.

**The solution**

Mr. Rishi Sareen guided the team in designing the framework and layout of an application named ‘SATHi’ (Service Accountability Transmission Handheld Instrument) to facilitate an integrated business process flow. They went live with the native Android mobile application running on associates’ smart phones in May 2016.

The proprietary technology provides end-to-end visibility of the field force (delivery boys) till the shipments are delivered to end-customers.

There was an existing ERP solution which supported the operations where shipments are picked up from customer warehouses and are brought to processing centers, where they are processed, bagged and handed over to Hub for onward connections to various destinations. Using the ERP, the office staff can assign field employee to each delivery.

At the delivery centers where shipments are received from various centers/hub for deliveries to end-customers, the SATHi app provides delivery associates with digital run-sheets, planned route, end-customer addresses, navigation and payment mode, to ensure smooth delivery. For getting information about deliveries, SATHi connects to the ERP system. SATHi app reduces dependency of field employees on office staff & boosts employee productivity.

Each operational step such as delivery to customer, cash collection from customer, etc. is captured and tagged with digital proof such as geo-coordinates, digital signatures. These give the management real-time updates about the status of their field productivity, allowing them to efficiently tackle unforeseen situations.

By automating the processes and the data, there is a reduction in the time spent on the admin tasks since automated reports get generated at the end of each day.

**Benefits**

The fully digitized last mile operations with indigenously built mobile app integrated with the core operations ERP system, ensures faster and real time updates, says Sareen.

“We developed the SATHi app to smoothen and fasten the process of the last leg of supply chain, thereby enhancing the end-customer experience,” he adds.

The ability of our last mile app to work offline too has proved beneficial in areas where internet connectivity is erratic.

“The 100 percent rollout will ensure a cost benefit of around INR 10 million per annum,” concludes Sareen.