### Project Title

**Multi-user range query supported searchable encryption**

Range query based searchable encryption is a method that not only perform keyword match but also facilitates range queries on encrypted data stored on a remote storage. The present technologies provide mechanisms for range queries, but involve a very high overhead in data storage and are applicable only on arranged data. Such databases possess high scalability issues due to difficulties in data addition, modification and search. More research is required to support multi-user setting. The scope of the internship includes research on the concept of range queries over encrypted data on a secure but curiously data store in a multi user scenario. It covers the analysis of the existing methodologies on query based searchable encryption and to propose a method in a multi user scenario for real time data. The intern may also develop a security analysis model and proof of concept to demonstrate the proposed solution.

**Access control supported searchable encryption**

The goal of this project is to propose a novel security solution that eliminates potential security threats on outsourced data, assures privacy and also supports access control. In particular, we will propose technique for search in encrypted data that would allow different participating entities to own data privately while preserving users' privacy. The present technologies provide mechanisms for search on encrypted data, but involve a very high overhead in data storage and no support for access control. More research is required to support multi-user setting. The scope of the internship includes research on access control and search over encrypted data on a secure but curiously data store in a multi user scenario. It covers analysis of the existing methodologies on access control based searchable encryption and to propose a method in a multi user scenario for real time data. The intern may also develop a security analysis model and proof of concept to demonstrate the proposed solution.

**Simulation of a railroad network using JavaSim/JIST**

Strategic planning is a critical component of operating a large railroad. Simulation modeling has several major uses within the strategic decision making process of a railroad. Some of the key elements for railroads are the most efficient design of the service offering, effective use of assets, and containment of cost, but without compromising safety. The objective of this project is to develop a user-friendly railroad network simulation program using JavaSim/JIST that simulates rail system operations based on user defined train, infrastructure and timetable databases.

### Project Description

**Structural Health Monitoring of composites**

Composites during service undergo various failures which requires structural health monitoring. This project deals with structural health monitoring aspects of composite structure like failure identification, critical parameter identification, sensor identification, sensor networking, diagnostics and prognostics.

**FarmBank 360**

10% of rural people are unbanked and underbanked. According to World Bank report some of them are not using bank due to geographical barrier, some of them are not having enough money to save or to transaction bank. It is evident that a new channel is the need of the hour to bring them into the fold of banking system. A one stop platform for all banking related activities of rural people. It stores the data related to farmers and rural people right from soil to plate using SMAC. Based on this data, we can cater to the needs of different business entities such as FMCs, Banks, Farming input providers, Agricultural input providers can predict their revenue streams with precision, and policy makers can link the subsidies based on the performance and lifestyle of rural people. For example, Farm bank 360 would help us to predict the micro level detail such as a credit score of a marginal farmer to the macro level details such as minimum support price for food produce, food safety and security of the nation.

**Advanced Mobility strategy for enterprises**

This project is focussing on identify advanced mobile computing themes that are expected to impact the industry in the next 6 to 3 year time frame. The scope will be contribution to definition of strategy and building technology assets.

**Assessment of a Unified Cloud Ecosystem Enterprise Standards definition and compliance process**

Perform the current state assessment of the Cloud Ecosystem Application and identify different areas for improvement related to User input, User experience flows as well as User Interface Text, Identification and Gap Analysis of all the aspects of User Interface text and content. The intern needs to have functional aptitude for Enterprise web applications with focus on User Interaction and Experience analysis.

**Billing Models for Cloud Services**

Identify and come up with different kind of billing models that CEH should support. These billing models should cover the different kind of cloud services such as Pure Infrastructure Services, Different set of SaaS Services, Software Licenses, Development Environments. Research is required on different cloud services and may include study of competitor products & billing solutions on what models are supported.

**Building a Cloud based service on Computer Vision for Web and Mobile**

Computer vision is an emerging area. The project will build a Cloud-based service, that will help several business platforms like BrandLedge.

**Incremental to Transformational improvement through Reuse**

Study the existing reuse system, reuse practices, offerings, measurement models, evangelization, and deployment and reach out mechanisms, channels of employee engagements Understand Infosys organization structure, verticals, horizontal, service line wise organization, high level services offered by each service line in a vertical Come up with strategies in the area that need improvement.

**Secure Mobile Applications Development platform**

Mobile security has become one of the biggest concerns. There is a need to adopt defensive in depth strategy for securing Mobile devices. Security needs to be implemented at multiple levels at Wireless communication Layer, Device Hardware layer, OS layer and Application layer. Currently OS layer is less equipped to self-detect and counter any security threats.

**Forensic ready secure Mobile apps for jail broken or rooted devices**

Smartphone mobile apps are growing at a phenomenal pace, thousands of apps are created and uploaded to Android market, Apple App Store, BlackBerry App World and Windows market place. Apple designed the iOS platform to control the hardware and software. Users don’t have a provision to install a lot of software outside App Store and resort to Jail breaking. There is need for developing security framework for jail broken devices as well.

**Securing mobile devices by applying anti forensic techniques**

In the past crime was committed without the knowledge and aid of technology. Todays world, criminals are aware of Digital forensics and came up with ways to counter forensics known as anti forensics. Thus arose the need for Anti Anti forensics for securing mobile devices.

**Mobile Security Testing for iOS, Android and Windows phone apps**

Mobile security testing methodology, framework, process, tools and technologies for iOS, Android and Windows phone applications. With mobile applications on the rise, their is increasing security threats which customers need to address.

**Security, Privacy and Digital forensics approaches with emerging technologies**

Implications on Security, Privacy and Digital forensics approaches with emerging technologies in next 10 years.

**Long Term Pattern Analytics Methods, Techniques, Algorithms and Open Source Components**

This project investigates and develops a long term data pattern analytics framework that is capable of providing intelligent feedback. The key objectives are estimating personal mood social network analytics and context dependent recommendation for adapting and recommending or automatically switching strategies on the basis of the huge amount and diversity of historic data streams that are acquired about the context physical mental and social well being of individual people but also masses possibly stored and shared across different social media networks.

**Intelligent Decision Tree based Solution for Complex Production Support related Tickets**

The project output will directly be integrated with existing Platforms which enhance productivity of Support Engineers in Production Support domain currently being used in ADM service line projects. This project requires working code to be delivered which can be integrated with existing platforms or can be built as independent solution.

**Computer Vision - Image Search**

In this project, the requirement is to locate if a specified image is available in the current snapshot of the image. The objective is to identify images and their feature using the image of interest. This project requires working code to be delivered which can be integrated with existing platforms or can be built as independent solution.

**Web User Interface Pattern Cataloging for Enterprise applications**

Software solutions involving Web user interfaces are the most common type of projects maintained and developed by Infosys. In many maintenance projects, a solution needs to be enhanced with new features. This requires changes to User interfaces as well. With a prior knowledge in the form of a searchable catalogue of enterprise application web user interface patterns can help project teams to automate these development activity or can also be used to consult clients on best practices. Following are the deliverables expected, a. A survey of all the available web user interface patterns b. A documented list of enterprise web user interface patterns with one or two samples and c. A system to catalogue and search the documented patterns.
Estimation model for large deals and its applicability in other services

We have created an estimation model to estimate the project delivery execution parameters such as Full Time Employees count, onsite employees count based on the application portfolio characteristics such as number of applications, technical complexity, business complexity for the large deals. These models uses random forest regression tree based models to estimate the project delivery execution parameters. These estimation models based on the large deals application portfolio characteristics. The objective of this project is to understand various quality attributes. This helps to take better informed decisions on the applications and help to reduce overall portfolio complexity and improve productivity. Some of the insights from the tool can potentially be used to get better estimates for future changes as well. The objective of this project is to understand various quality indicators produced by CAST tool and list how these can be used to improve the various aspects of the software maintenance lifecycle.

Enhance the effectiveness of software maintenance portfolios by leveraging the quality and health in IT portfolios which organizations typically maintain have large number of applications built on multiple technologies, programming languages etc. The complexity of these applications/systems is quite high. Application mining tools like CAST help to understand the systems better to get better insights into the various quality attributes. This helps to take better informed decisions on the applications and help to reduce overall portfolio complexity and improve productivity. Some of the insights from the tool can potentially be used to get better estimates for future changes as well. The objective of this project is to understand various quality indicators produced by CAST tool and list how these can be used to improve the various aspects of the software maintenance lifecycle.

To develop Assessment model software platform to determine key business KPI for monitoring and self

This project will define assessment model in identifying key business process areas , KPI , metrics and business events for determining monitoring requirements of business performance and defining business service level agreements . The project will involve in developing software platform in microservices technologies. The framework should achieve following key objectives a) Identify key business process and identify key business events to monitor and define service catalogue b) Define Business SLAs c) Measurement and Reporting Frequency As part of defining the key features of platform , it is expected that Intern will go through existing knowledge base and tools and define requirements. Based on requirements Intern is expected to develop prototype screens and develop key functionalities.

Computer Vision - Controls identification

When the snapshots/shots of currently running applications are taken, the whole image of the application is captured. This needs to be further analyzed to recognize what UI elements are available in the screen, like 'text box, button etc. In this project, the geometric pattern recognition approaches are applied to locate such controls for in the screens.

UI Automation

The non .net applications include SAP, Java and Browser based apps which don't directly integrate with Windows API due to which retrieving the controls and object information is not easier for these applications. In this project, the work involves trying out different techniques for automation of accessing SAP/Java applications.

ITSM Automation Evaluation

There are many open source tools available for process and testing automation, accounting for different needs of automation. This project involves determining evaluation criteria and also evaluation of these tools for applicability to ITSM Processes automation.

Data Extraction using NLP processing

When we have request details in regular English form, it is needed we parse them to extract relevant information. In this project, the work involves using multiple tools to extract multiple patterns from requests as per different patterns. The input text may not adhere to complete sentences oriented grammar and all such cases need to be considered.

Rapid prototypes and self contained applications for demo and user trainings

Problem Statements: 1 How do we show the end users the look and feel of an application? 2 How can we deploy this prototype on a stand alone and self-contained? without a need of a server and sales team can easily run it with just browser 3 How can we make this prototype non-static, which can retain the information entered by the users - at least in that particular session 4 How can we re-use the code and speed up the development? 5 How can we convert this prototype into a Training Server? Probable alternatives: 1 The easy answer is build prototype or wire frames which can do the work. 2 However it has limitations and cannot address many of the problems given above. 3 There are few tools in the market which facilitate rapid prototyping like Axsor, Protoshare, Justimind, rise etc but does not solve all the problems. Advantages: 1 This tool can be a good candidate for IP 2 Can be used across industry segments 3 Can be offered as a Differentiator in all our proposals, especially if we develop as an Eclipse plug in Deliverables: A tool or a framework which can deliver the above functionality and address the problem statements Potential risk: Since the idea is posted on internet, it could be potentially developed by our competitor as well.

Digital platforms in the intersection of cloud, mobility and analytics.

Creation of next generation platforms in the intersection of cloud, mobility and analytics. This would involve some idea, prototyping of platform that will act as a strategic business platform, industry-agnostic for managing business services of tomorrow's digital enterprises and their ecosystems.

Automated Code Conversion

In a typical software deployment lifecycle, the software code has to undergo multiple changes because of changes or updates in the underlying libraries/systems that the software code is dependent upon. In such cases, the software code has to be modified/re-written in order to accommodate the new changes. The aim of the project is identify the code conversion scenarios that can be automated, define the approach to automate the same and develop a framework and technology platform to enable automatic conversion of the code. The project involves research and development of various techniques and approaches for code conversion including parsing techniques, rule engines and exploration of different technologies like scripting, etc.

Testing optimization for package upgrade

In a package (Oracle EBS, SAP, etc.) upgrade scenario, testing is a very crucial and time consuming activity. Package upgrade requires changes to the custom code and testing the upgraded code in the new environment. This project is aimed at identifying the impacted functionalities based on upgrade impact on custom code, optimizing the testing activities and automating various testing activities.

Training Automation

Any technology transformation such as new package roll-outs, new application roll-outs, modernization of application, etc. requires training and enablement of end-users for new/changed functionalities. This project aims at automating training activities such as content creation, on-demand delivery of training using different technology approach such as authoring of training content by automatic capturing of training transaction, context based integration of training content to end users.

Enterprise Application Portfolio Management Framework

Enterprise Application Portfolio Management Framework Activities 1. Understand Application Portfolio Analysis service offering 2. Define solution for a sustainable Application Portfolio Management in the context of Portfolio Inventory, Analysis, Rationalization, Sustainance 3. Develop framework for evaluating application portfolio management tools 4. Identify leading APM tools in the market and evaluate using the evaluation framework 5. Build an APM tool for basic functions like inventory management, dependency matrix, business capabilities matrix etc.

Holistic approach for product modernization from unstructured, legacy systems

We are living in the age of Google and mobility. However, many products are stuck in the legacy-ness and the obsolescence of the hardware. The architecture, data behind these legacy systems may be unstructured, and the maintenance cost could be very high. The product owners have the choice of developing new things from scratch or take proven approach to modernize their product. This project is to define and automate a holistic approach for product modernization from such structured and unstructured legacy systems.
Omni Channel reference architecture (for commerce and distribution both) and Omni Channel Hub cove There has been dramatic shift of customer purchasing trends towards Omni channel retail where a movement of 5 percent to 50 percent of total sale is evident in online channel, mobile based purchase compared to traditional brick-and-mortar sales especially during the peak season. While this shift is inevitable due to ease of purchase and wide options customer has, this dynamics has brought new challenges in Commerce Systems and Supply Chain Operations i.e. in Order Management, Fulfillment, Integration etc. These challenges have become more visible and loud during high demand seasons to cause medium to severe system usability, scalability, flexibility and usability. It requires new approach, new patterns and new strategy covering architecture, technology and process dimensions to handle them. Objective 1 Elaboration of Omni Channel Retail characteristics 2 Behavior of Order, Inventory, Customer in Omni Channel retail 3 Omni Channel Architecture Pattern 4 Inventory 5 Single View of order 6 Agility of return process Key capabilities that retailers want to implement during Omni Channel evolution 1 Buy Anywhere 2 Ship Anywhere 3 Return Anywhere 4 Distributed order management through variety of channels 5 Reserve in store 6 Store level online and pick up at multiple locations 8 View into vendor inventory 9 Tracking exact location of the item within store, backroom, shelf, etc. Deliverables- 1 Omni Channel Capability definition 2 Omni Channel Commerce Architecture Pattern 3 Omni Channel Distribution Architecture Pattern 4 Omni Channel Planning Architecture Pattern 5 Working Omni Channel Hub using existing package technologies

Business processes for enterprise wide technology change management There are many stakeholders when an orgwide technology management happens. The initial steps and the defining moments in getting everyone into the business stakeholders of the backlog, we can define a business process for enterprise wide technology change management initiatives and automate it. This can be deployed in the coming years.

Remote Infrastructure Management through Mobile Devices/Apps Infosys Labs Advanced Mobility (our group) is working with the GMU-IMS team, in exploring Remote Infrastructure Management through Mobile Devices/Apps. We wish to have an intern with Mobile Application Development Knowledge to build some prototypes/POCs in this space. This will be very useful for Infosys to showcase to our Clients in the IMS space.

Development of a tool for programming skill assessment Problem solving and programming is one of the key skills for employees in a software services organization. Accurate assessment of this skill is important for various functions such as staffing, career progression and so on. The aim of this project is to build an automated programming assessment tool. The tool should support various common programming languages such as Java, .NET and evaluate the submissions from various perspectives such as functionality, performance, maintainability and report. The expected output is a usable tool for programming assessment and associated documentation.

Development of next gen cooling solution The infrastructure and green initiatives at Infosys is engaged in implementing various cutting edge energy saving technologies and strategies at building and campus level. The team has implemented a variety of energy conservation measures to conserve energy in new and existing buildings. One of the important projects that the team is working on is to develop an in-house high efficiency cooling solution. The solution has potential to reduce the energy consumption by 30% and could offer 30% more cooling capacity as well as compared to existing solutions in the market. The project calls for studies, analysis and selection of the most suitable material for this product. This project requires materials science expertise. The objective of this project is to model the most efficient and reliable product available in the market. The project should also determine coatings and or materials which will further enhance the performance and or capability of the product. Infosys desires to patent the product and internship will play a very valuable role in product development.

A Recommendation engine for Konnect, the Infosys Professional Networking Platform. A Recommendation engine for Konnect, the Infosys Professional Networking Platform. Konnect is a real time information sharing and people networking system encompassing the multi-dimensional profiles of its members, their network and experiential knowledge, along with innovative search and exploration mechanisms. The application provides interfaces to discover, connect and share information and knowledge for promoting professional networking within Infosys. Networking today, is about the analysis of the raw data at hand, and using the information gleaned to recommend various aspects of the networking system to its users, thereby increasing the visibility of the content and participants.

Constraint checking of SBVR rules extracted from data schema files In this work we shall try to extract business rules from data schema/UML models for facilitating requirements authoring. The business rules constraint business structure or control behavior of a business process. In modern business modeling, one of the important phases is writing business rules. Typically, a business rule analyst has to manually write hundreds of business rules in a natural language (NL) over an input data schema file and then manually translate NL specification of all the rules in a particular rule language such as SBVR, or OCL, as required. In this project we are trying to check the consistency of SBVR rules that we extract out of data schema documents. Earlier we have come out with an automated approach that automatically translates the NL (such as English) specification of business rules to SBVR (Semantic Business Vocabulary and Rules) rules. Further we use database schema files as domain file which would serve as the vocabulary of generated SBVR rules. We have used an existing SBVR reasoner for this project. Subsequently we have create a formal framework in which we can check the consistency of these generated rules. We are planning to extract a formal model out of data schema files in semantic web formalisms OWL and also translate SBVR rules to OWL/SWRL rules. Then used SBVR reasoner we can check the consistency of the rules. Please see the architecture of our proposed approach.

Application development to offer security service in Cloud Information technology/IT enabled services over web are rapidly growing. As increased adoption of cloud. Cloud services model need have clear advantage over traditional IT data centers as it utilizes shared resources and helps individual enterprises to reduce cost. However, security and privacy are still concern for enterprises and end users who are considering migration of data and applications to cloud. The objective of this project is to make the product the most efficient and reliable product available globally in buildings industry.

Document Summarization Web service and User Interface Document Summaries are useful to reduce the human effort and thus improve productivity in extracting key aspects of a document. This involves the creation of a optimal system model for document text and implementing techniques for ranking sentences. This project will extend and enhance an existing prototype implementation of doc summarization and create a demo of document summarization system with a backend web service and a Web based front-end. It will involve programming in Java, Javascript, JSON, XML and require a basic understanding of Information Retrieval or Natural Language Processing (Text Analytics).

Search User Interface for Smart Search With the deluge of data both internal and external Search is increasingly becoming an universal gateway to Enterprise Information. The Search User Experience is critical in realizing key outcomes and demonstrating the value of underlying search technology. In this project, teh intern(s) will explore design options for search user interface and build a set of re-usable components in Javascript based on a coherent design for teh search user interface. We expect the intern to be proficient in html, css, javascript. We use expect the intern to be proficient in javascript. We expect the intern to be proficient in javascript, user experience design and basic understanding of search systems.

Calculate Process Variation The process of project "Automated test generation for business processes". In this project, we need to study existing methods of calculating the differences between two processes. Based on the study, either we select and implement a method or develop a new one. The method can be used for identifying the regression test cases for a given business process.

Automated Regression Test Generation for Business Processes The objective of the project is to generate identify/generate test cases for regression testing business processes. For two given process models and their differences, there is a need to generate minimum number of test cases which are required to test the change.

Agile / Iterative Approach Agile software development is a conceptual framework for software engineering that promotes development iterations throughout the life-cycle of the project. Each iteration is an entire software project: including planning, requirements analysis, design, coding, testing, and documentation. This framework provides enough functionality to warrant releasing the product to market but the goal is to have an available release (without bugs) at the end of each iteration. At the end of each iteration, the team re-evaluates project priorities. This Project mainly covers the below aspects. 1. What are the typical techniques that you can face while executing our project in Iterative/ Agile manner? 2. Any special consideration in Architecture / Design or development And? Or learnings through which we can avoid certain pitfalls? 3. Any artifact on Approach / Tracking etc. which can be reused.
M2M Communication and Data Analytics

M2M has been defined as one of the focus area for Engineering Services. One of the focus of M2M is Data Analytics. The project will help to find out the market potential in the industry for data analytics in the area of M2M. In the above context Interns are to research in the area of M2M and Data Analytics. Analysis will be based on internet and public reports on the subject. Some of the topics interns has to cover are mentioned below - M2M Data Analytics Market potential. Drivers for growth of M2M Data Analytics. Use cases for M2M Data Analytics in various verticals such as Aerospace, Automotive, Oil and Gas. Telecommunication, Retail etc. Key Players providing Data Analytics platforms and products for different verticals for M2M. Mergers and Acquisitions and Partnerships for Data Analytics in M2M. Standards for data exchange in M2M for different verticals. Alliances and Forum. Opportunities rising from Convergence of Social networking and M2M. Challenges for M2M Data Analytics Offerings and Engagement of vendors like Accenture, IBM, TCS, HCL, Wipro etc. Intern would have to procure a research reports based on the above points. Intern should have access to internet to access the public information on the subject.

Cloud Hosting for PPM (Project/Program Mgmt) System

1. Analyze feasibility of CLOUD hosted PPM product as SAS solution vs standalone implementation of it. Conclude feasible option and cost and perform cost benefit analysis

Define Support Models for various domains

Define various maintenance process (support model & SCP model) suitable for various domains / client maturity / age of relationship. Target is to define something which can be adopted as standard in Infosys.

Mobile Applications Security Assurance

Emerging mobile technologies such as PDAs, laptops and smart phones together with wireless networking technologies such as WLAN and UMTS promise to empower mobile employees to become better integrated into their company's business processes. Due to their convenience and ubiquity, it is widely accepted that secure mobile business applications that takes into account the need for strong security credentials. The focus is on application layer, specifically to web applications, rather than internals of mobile OS cause security flaws. Hence, a study of state of the art mobile web application security is very crucial. The problems are still applicable to mobile web applications, there could be additional security threats due to limited resources compared to todays desktops, usage of mobile devices is gaining prominence and the need for mobile version of web applications are growing. Though traditional web applications have been existing for a long time, they have seen serious security problems due to flaws at various stages such as insecure coding practices, flaws in browsers, flaws in upcoming web standards like HTML5 etc. While these problems are still applicable to mobile web applications, there could be additional security threats due to various reasons such as insufficient resources, storing sensitive user information, persisting session details for longer durations, access control to device APIs etc. Moreover, mobile browsers themselves might implement modern specifications like HTML5 in an insecure way due to resource constraints, which can cause security flaws. Hence, a study of state of the art mobile web application security is very crucial. The goal of this project is to analyze how mobile web application security differs from traditional web application security. The focus is on application layer, specifically to web applications, rather than internals of mobile OS or mobile apps. Identifying what extra precautions should be taken and what best practices to be followed in developing secure mobile web applications is the major outcome of the project, which is useful for the enterprise as a whole.