

Undergraduate Fourth Year Projects

Software Engineering Laboratory

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Project: Frameworks to support Continuous Software Engineering

Description

The focus will be to design and develop tools to deal more efficiently with challenges pertaining to shortening bug fixing and maintenance cycles and, achieving continuous delivery. The project can host up to three students and will aim to:

- a) design and implement infrastructure for collecting and modeling system data from diverse information sources such as application logs, user newsgroups, and technical reports related to application failures and application performance,
- b) design and implement tools for processing, analyzing, and amalgamating the acquired information into analytics reports, so that these can be efficiently disseminated to the appropriate stakeholders such as project managers, system architects and, developers and,
- c) design and implement enhancements to existing IDEs (e.g. Eclipse) and collaborative development frameworks, in order to assist the appropriate stakeholders to quickly act upon the acquired information in their native work environment, and better plan and shorten the time required for micro-services application development, maintenance, and deployment.

Project: Adaptive and hypothesis-driven software monitoring

Description

The objective of this project is to design and implement a framework that allows for policy driven adaptive monitoring. The main idea is that monitoring intensity can be dynamically adjusted according to hypotheses generated from current observations. For example, when logged events may trigger an hypothesis that suggests an intrusion or another cyber-threat, the monitoring infrastructure will start logging processes in a targeted way and more intensively, while when the system operates in a healthy mode monitoring can be less intrusive, conserving thus computational resources.

Project: “Context Aware Resource Oriented Services”*Description*

Over the past five years we observe the emergence and adoption of Resource Oriented Computing and RESTful services. The main premise is that under Resource Oriented Architectures, information elements as well as computational components are considered as internetworked “resources”. These “resources” respond to HTTP commands (i.e. PUT, POST, GET, DELETE). For example, upon issuing a GET on a resource, this resource returns its description along with a collection of hypermedia controls which inform the calling party what operations can be performed on it.

The objective of this project is to design and implement a framework whereby resources respond in a different way to requests, according to the invocation context, the client’s state issuing the request, as well as according to specific system-wide goal models. Application examples include customizable digital assistants (e.g. digital assistants to support engineers on performing specific tasks) , and personalized service provision.

Project: “Personalized Web Tasking Frameworks”*Description*

The project deals with the design and implementation of models and infrastructure that allows for personalized service tasks to be both specified and enacted. The tasks pertain to operations (e.g. web services, RESTful services) that can be assembled using specification models, in order to perform customized and context aware services on behalf of the users. For example, a user could specify the conditions, the information sources, and the triggering events for internet services to be enacted on his or her behalf. The project will focus on the design and implementation of the task specification models, as well as the run time engine of the framework. The project can host two students.

Project: “Empirical Analysis of Software Project Data”*Description*

The objective of this project is to use data analytics tools, such as Watson Analytics, to identify interesting correlations between different software project parameters. For example, a strong correlation may be found between the programming language used, the system’s function points and the critical defects observed, meaning that the former two parameters are strong predictors for the latter. Statistical analysis using such data analytics tools can investigate all possible combinations of parameters. Real project data will be available to assess the framework.

Project: “Software Root Cause Analysis”*Description*

The objective of this project is to devise techniques and investigate the use of software analytics and mining of software repositories (bug report repositories, version control systems, collaborative development repositories) in order to identify possible root causes given an observed system failure or symptom (e.g. violation of a service level agreement) in complex software systems. The objective is given an initial set of symptoms to identify with a level of confidence the possible areas of the system (e.g. modules, files, functions) where the root cause lies. Real project data will be available to assess the framework.