**Best Project Groups Year 2014-15**

| Sr. No. | Name of Students | Title of Project | Area | Sponsoring Company |
|---|---|---|---|---|
| 1 | Harshada Tupe<br>Rupali Gangarde<br>Neha Joshi<br>Gauri Bhutkar<br>Krati Jain | ElastiCon: A Distributed Elastic Controller in SDN Environment | Software Defined Networking | GS Labs |
| 2 | Charul Bagla<br>Gautami Shetty<br>Sarika Dhoot<br>Anagha Diwanji<br>Sampada Sathe | Analysis for water resource management | Data Analytics and analysis | Persistent Systems Ltd. |
| 3 | Prachita Mane<br>Chaitrali Nare<br>Nikita ramesh<br>Noopur Maheshwari | Improving CFGLP and OptGen Integration | Compilers ( Data flow analysis, optimization) | GCC Resource Centre, IIT Bombay. |
| 4 | Aditi Sardeshpande<br>Aishwarya Bapat<br>Sanika Betawadkar<br>Chaitrali Patne | Detection of Dental caries from Dental Digital Radiographs | Image Processing | In-house |
| 5 | Ishwari Chitnis<br>Ketaki Joshi<br>Pooja Khivasra<br>Kshipra Namjoshi | Opt-Gen -An Optimizer Generator for cfglp | Compilers ( Data flow analysis, optimization) | GCC Resource Centre, IIT Bombay. |

# ElastiCon: A Distributed Elastic Controller in SDN Environment

Abstract

Computer networks have many kinds of equipments. In current network architecture, Network components have Control plane which takes decision about handling of traffic ,coupled with Data plane which forwards traffic according to Control plane decisions. Software Defined Networking (SDN) is the technology that enables innovation in networks by separating the control plane and the data plane. SDN makes computer networks more programmable. The SDN controller is an application in software-defined networking that manages flow control to enable intelligent networking. Distributed Controllers are proposed to address reliability and scalability issues, but are statically configured which results in non-uniform load distribution. To overcome this issue we propose, a distributed elastic controller in SDN environment where controller pool is dynamically expanded. We propose a protocol for live migration of switch for such dynamic load shifting in Opendaylight controller.

# Analysis for  water resource management

## Abstract

NGOs, administrative bodies and analysts require information about current scenario of water management in the country today. With the help of good information, they can direct their work in regions which lack good quality water and availability of infrastructure for drinking water. Also, awareness should be spread regarding good practices of water conservation, judicial use of water and proper waste water management.

This project aims to highlight the water related scenario of the country such as infrastructure and water quality. Analysis is done to study the infrastructure available for access to water and the quality of water available in the country with the help of clustering. Gradation of quality of water supplied to different regions is done in order to analyze which regions need immediate attention. Articles are available regarding effective utilization and management of water. Based on the meter data acquired under the 24X7 scheme Malkapur, Maharashtra usage patterns are identified. This project also enables the user to select a dataset available on the website and choose the type of visualization dynamically to obtain required results. All this information is vital for NGOs, engineers and common man in order to improve the water management and availability scenario of the country.

Clustering, time series, statistical inference techniques are used to perform the analysis. HTML, CSS and JQuery are used for web development. PHP is used for server side scripting. Data is stored using MySQL. All types of analysis and visualizations are performed using R IDE.

# Improving CFGLP and OptGen Integration

Abstract

Compiler construction is an area of Computer Science that deals with the practice of developing programming languages and their associated compilers.  A compiler is a special program that processes the source code and turns it into a machine language or object code. It covers the syntax, grammar and semantics of programming languages. The area of Compilers in Computer Science has a strong tie with linguistics. These linguals are generally found to be obfuscated.

The CFGLP (Control Flow Graph Language Processor) tool removes this obfuscation and elusiveness by clearly depicting phase by phase intermediate representations of the source code. This tool is implemented for undergraduate courses cs302+cs306 at IIT Bombay in order to create a small code base for a compiler construction class that can be enhanced systematically by the students.

CFGLP takes a pre-processed CFG file as the input in order to produce the various intermediate representations. This pre-processed CFG file is generated from GCC cfg dumps by the CFGPP tool.

The aim of this project is to include function calls in the 2.0 version of the tool, generate CFG, AST, TAC, Symbol Table and Type table from the source code using the CFGLPv2.2 tool, integrate CFGLP with OptGen (Optimizer Generator),  include pointer analysis in the tool and display these intermediate representations on a graphical user interface using JSON (lightweight interchange format) and D3.js (Javascript library for manipulating documents based on data).

This project will help students to learn various compilation sequences. It will help teachers to elaborate the intermediate representations and researchers to add their own optimizations.

# Detection of Dental caries from Dental Digital Radiographs

## Abstract

Dental disease diagnosis is conventionally done with the help of radiographic films. Use of radiographic films introduces errors as a result of noise and other environmental interferences. Thus, we are using digital radiographs which will aid dental practitioners to identify dental diseases with ease.

This project is made in MATLAB 7.0 and it uses various image processing techniques such as filtering, segmentation, etc. In this project as a pre-processing technique, rotation of an image is done. After pre-processing, frequency filters are used to ease the detection of caries. Histogram study is done to understand the intensity of images which finally helps in the detection of caries. Boundary descriptors are used for teeth segmentation and detection of caries.

This project helps in caries detection and can be used in various dental institutions and clinics.

# Opt-Gen-An Optimizer Generator for cfglp

## Abstract

A compiler is a program that accepts a source program in one language and converts it into a target program which is semantically equivalent. Optimization is one of the most important phases of compiler which is subjected to frequent enhancements. Compiler optimization is a technique that converts a program into a semantically equivalent program that uses lesser resources than before by performing suitable analysis and transformations.

Optimizer Generator (Opt-Gen) is a tool which will read the specifications file and generate an optimizer (customized analyzer and a customized transformer) based on the specifications. This tool will also allow users to experiment for creating new optimizations. Optimizer programs till now were written manually. The aim of this project is to automate the generation of optimizers by designing an Optimizer Generator.

Opt-Gen is a stand-alone product. A C++ code i.e. the corresponding Optimizer is generated based on the input specification language provided that the specifications of optimizations confirm to the proper input specification language format. The input to the optimizer generator (Opt-Gen) would be given in input specification language and input to the generated optimizer would be the three address code which confirms to the Control Flow Graph Language Processor (CFGLP) norms. The optimizer thus generated by Opt-Gen will be capable of optimizing the input program by applying various optimization techniques.

Opt-Gen is incorporated with Worklist technique for Intra-procedural Data Flow Analysis. It also supports Inter-procedural Data Flow Analysis using Value context based method. Points-to analysis using LFCPA is provided for Intra-procedural Data Flow Analysis.

This tool finds its application at Institutional Level by students and faculty to understand the optimization techniques easily by observing the intermediate steps and details displayed by it. It is also used by the data flow analyzers to experiment with new optimization techniques.

**Keywords:** Opt-Gen, Optimizer Generator, Worklist, Round-Robin, Intra-procedural, Inter-procedural, Data Flow Analysis, LFCPA , CFGLP ,Input Specification, Analysis, Transformation.