****** **Faculty of Arts, Computing, Engineering & Sciences**

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# Executive Summary

# Research

The first step in producing an application that provides Java language optimisation suggestions is to produce a set of possible optimisations.

## Possible Optimisations

### For Loop Unrolling

(Troy Downing 1997)

### Recursion Optimisation

### JIT – Just In Time Compilation

### Appropriate Primitive Types

### Full Object Dereferencing - Garbage Collection

### Deprecated Classes

### Cut & Paste code

### Printing Exceptions to Console

### Run()/ Start () for Threads

### ArrayList Reset()/ Clear()

### Code In-Lining

### Conditional Statement Ordering

### Constant Folding

### Constant Propagation

### Strength Reduction

I\*5 – i+I+I+I+I

### Common Sub-Expression Elimination

(I+j) \* (i+j) – t = i+j; t\*t

## Language choice

### Python

### Java

### C++

## Abstract Syntax Tree

## Implementation Platform

### Eclipse Plugin

### Atom Package

### Command Line Interface

# Design

## Parser

## Abstract Syntax tree

## Objects Orientation

## Tree traversal

## Interface

## Testing

# Implementation

# Bibliography

BRUCE TATE, Justin Gehtland (2004). *Better, faster, lighter Java*. O'Reilly.

[online]. <https://docs.python.org/3/>

JR, Robert Simmons (2004). *Hardcore Java*. O'Reilly.

MARK, Ronald (2009). *Writing Compilers and Interpreters: A Software Engineering Approach*. 3 ed., John Wiley & Sons.

MATTHEW ARNOLD, Michael Hind, Barbara G. Ryder (2002). Online feedback-directed optimization of Java..

PAUL, Javin (2014). *Java Revisited.* [online]. <http://javarevisited.blogspot.co.uk/2014/09/common-java-multi-threading-mistakes-1-run-vs-start.html>

PAUL, Javin (2015). *Java Revisited.* [online]. <http://javarevisited.blogspot.co.uk/2015/09/how-to-reset-arraylist-in-java-clear-vs-removeAll-example.html>

[online]. <https://atom.io/docs>

TROY DOWNING, Jon Meyer (1997). *Java Virtual Machine*. 1st ed., O'Reilly.

WALDO, Jim (2010). *Java: The Good Parts*. O'Reilly.

WIKIBOOKS (2011). *Python programming*. CreateSpace.