ITECH5403 - Assignment 1 - Language Design Essay

This assignment will test your knowledge of programming language design features, and is worth 20% of your non-invigilated (type A) marks for this course.

Topic Overview

Since the development of Plankalkül back in the 1940s, a large number of programming languages have been designed and implemented - each for its own specific problem domains and made with its own set of design decisions and compromises. For example, there are languages which:

- Are **strongly typed** and **loosely typed**,
- Provide support for **object orientation / abstraction** of data types,
- Use **static** or **dynamic** scoping rules,
- Provide **memory management** (i.e. garbage collection) or allow the developer fine-grained control over heap-allocation and recycling,
- Provide **closures** to allow functions to be passed around like variables,
- Allow easy access to **array slices** and those which do not,
- Perform **internal correctness checking** of data and/or **try/catch exception handling** and those which do not,
- Provide diverse and comprehensive suites of **built-in functionality** and those with a more limited set of features,
- Use **pre-processors** and **macros** to selectively expand or substitute source code, etc.

Each of these decisions can have a profound effect on the usefulness of a programming language in terms of factors such as its speed, robustness and general suitability to create programs of a certain type, such as for operating systems, or in the areas of business, scientific computation, artificial intelligence or video games.

The topic of your essay is to **design a programming language for the problem domain of:**

Mobile Applications

Mobile application development is a specific subset of standard application development which must be able to handle a wide variety of different tasks. So a programming language suitable for this must be able to do things like:

- Have comprehensive support for user interfaces (i.e. GUIs),
- Be able to work in an efficient, event-driven manner,

- Be able to model real-world problems using custom data types (i.e. support abstraction),
- Provide the ability to send and receive data to/from servers or other devices,
- Allow for the use of rich multimedia capabilities to enable sound/video playback and allow video games to be created (even if just via libraries),
- Be very efficient to minimise battery usage on these mobile devices,
- Etc.

It's worth thinking about the aspects of a mobile device oriented programming language in terms of a number of features, including:

- Performance;
- Data types and structures;
- Maintenance / Reliability of code; and
- Security requirements.

With this in mind your task is **to *theoretically* design a language suitable for the use within the mobile applications domain**.

The actual implementation of the language and tool set is obviously outside the scope of this course, but you must express and justify the design decisions behind your programming language in terms of:

- The features and functionality that will allow your language to be suitable and useful within the problem domain (including what differentiates it from existing languages),
- The programming paradigms, such as procedural, object oriented, logic and functional programming.

You are free to design your language to be either interpreted, compiled or to work in a hybrid manner, but you must thoroughly justify your decision. All language design choices must be legitimate, rational decisions which are backed up by robust discussion of the subject area.

In addition, your document should include numerous references to back up any and all specific claims that you make. All references should be made in the APA referencing style.

IMPORTANT!

Your essay should NOT be about the Java programming language, or the C++ programming language – or any programming language that currently exists. Your essay must be on the programming language THAT YOU DESIGN in terms of the features the language should have and the choices you make about what functionality, data types, compilation/interpretation, exception handling etc. that you decide should be included in the language to make it suitable for the specific problem domain.

Submission and Marking Process

Your essay should be **between 3,000 and 4,000 words inclusive** and may contain diagrams or images as you see fit. All diagrams, charts, images or other externally created materials incorporated into your essay **must be appropriately referenced**.

You must supply your completed essay in **Microsoft Word DOCX or PDF** format.

Assignments will be marked on the basis of fulfilment of the requirements and the quality of the work.

In addition to the marking criteria, marks may be deducted for failure to comply with the assignment requirements, including (but not limited to):

- Incomplete language feature coverage,
- Incomplete submissions (e.g. missing subject areas – see the marking guide),
- Poor spelling and grammar, and
- Incorrect adherence to the APA referencing style.

Submit your document to the Assignment 1 Upload location on Moodle before the deadline on Friday of week 7.

When you upload your assignment, it will be checked by the "Turn-it-In" plagiarism detection service – this means that the content of your document will be compared to millions of other documents to see if any text in **those** documents matches the text in **your** document. Turn-it-In can detect these matches even if you have made re-phrasing changes to some aspects of the text.

If you ***cite*** documents correctly, then this is a good thing – you are reading, learning and providing correct accreditation to the original authors of the work that you cite.

If you ***DO NOT cite*** instances of where you have taken the work of others, then this is plagiarism and will be dealt with under the university's plagiarism policy. The university takes plagiarism very seriously – you can read more about what is and is not considered plagiarism here:

http://federation.edu.au/current-students/learning-and-study/online-help-with/plagiarism

And the university's official plagiarism policy can be found here:

http://policy.federation.edu.au/university/student_plagiarism/ch01.php

The mark distribution for this assignment is outlined in the provided marking sheet on the following page.

Please use these marking criteria as the headings in your document, (with the exception of "References and APA referencing style" and "Spelling and grammar") so you know that you need to cover each and every aspect that is being marked.

ITECH5403 – Comparative Programming Languages

Assignment 1 – Language Design Essay

Student Name: **Student ID:**

Requirement	Weight	Mark
Providing your programming language with a suitable name.	1	
Introduction and explanation of language purpose.	10	
Choice and justification of interpretation/compilation method(s) to be used.	9	
Discussion of memory management and scoping features.	10	
Specification and rationale for major language features in terms of: - Simplicity, - Orthogonality, - Data types, - Syntax design, - Support for abstraction, - Expressivity, - Type checking - Exception handling, and - Restricted aliasing.	45 [5 marks per item]	
Discussion of the readability, writability and reliability of the language based on the language characteristics as chosen.	15	
References and APA referencing style.	5	
Spelling and grammar.	5	
Assignment mark total		**/ 100**
Contribution to unit mark (out of 20%)		**%**

Comments: