The University of Leeds
School of Computing

COMP5850M Coursework 4 - 2020/2021

Deadline: 30 April 2021, 10:00

1 Introduction

This exercise aims to give you some practical experience of using serverless architectures. It will also give you the opportunity to research on the cloud computing domain of Function as a Service (FaaS), technologies and performance.

The following deliverables are expected:

(a) a **research report** on the domain of investigation (6 pages maximum including diagrams and references). This takes the form of a short research paper formatted using IEEE conference manuscript template.

(b) **material** developed as part of the experiment design (code, scripts).

You should review the lecture notes on this topic carefully before you start work.

2 Useful Resources

Useful resources are available on COMP5850M module area on Minerva: `https://minerva.leeds.ac.uk`

Tasks

(a) Research into the performance of serverless architectures (open source or commercial) in order to provide insight into their capabilities and increase awareness of their potential. These are open source such as as Apache OpenWhisk and Fission, or commcercial such as Microsoft Azure Functions and AWS Lambda;

(b) Design a set of experiments to assess the capabilities and performance of a serverless architecture of your choice (open source or commercial). Propose a cloud-based technical solution for benchmarking and analysis of the serverless architecture using a set of test functions and demonstrate its performance in terms of effectiveness and efficiency.

3 Requirements

(a) Report on one serverless architecture of your choice;

(b) Consider one function of your choice, e.g. sum of an array of numbers, matrix multiplication, file read operation, file write operation, HTTP request ...

(c) Consider a single programming language for implementation of your function;

(d) Evaluate the performance of the serverless architecture in terms of scalability, e.g. by increasing the number of function invocations;

(e) Consider a benchmark for performance comparison, e.g. bare metal execution of your function.

4 Submission

- Use the document **Report** available in the coursework folder to report your investigation and findings. Submit the document through the link **Submission**. Microsoft Word and pdf file
formats are acceptable (pdf is encouraged).

- To submit your code/scripts for the exercise, create a Zip or tar archive of the file which make up your system and submit the file through the link **Code Submission**. Remember to include a descriptive README file as well as any additional material which you think are useful. Ensure you include all files needed to work as part of your submission.

5 Marking Scheme

Report

Drivers and Technologies	5
Related work	5
Architecture	5
Experimental Design	10
Results and quality of evaluation	10
Conclusion and Future directions	5
Write-up	5
Code/scripts	5
	50

This marking scheme is given as indication and will be tuned depending on the research topic.

Weight: this coursework accounts for 30% of the assessment.

How to write a good research report

This is only given as indication for a technical paper on 6 pages.

(a) Title (< 8 words) must hit the hot topic - short, clear and eye-catching. Authors and Affiliations (in 1-2 lines after the title)

(b) Abstract (max. 100 words) must state the research objectives, summarize the findings, and highlight the innovative contributions

(c) Introduction (including the title, abstract) on 1 page must motivate the readers to read the rest of the paper and prepare them with the necessary background

(d) Problem Statement and Formulation (0.5 page) of the problem being solved, basic assumptions, formulate the problem with technical specifications

(e) Architecture, algorithms, solution methods, protocols, analytical results and illustrated example etc. (1 page)

(f) Experimental setting (testbed, tools, benchmarks, datasets used (1 page))

(g) Experimental Results in plotted figures or tabulations plus their interpretations and performance analysis (1 page)

(h) Related Work and Conclusions (1 page)

(i) References - List of relevant papers (0.5 page)