TCSS 462/562: (Software Engineering for) Cloud Computing
Fall 2025

School of Engineering and Technology
University of Washington – Tacoma

Term Project Report/Presentation

Version 0.1

Due Date: Saturday December 13th, 2025 @ 11:59 am - FIRM

Objective

To capture results of the term project, each team should submit up to a four-page project report summarizing the serverless application implementation design and the case study results. Alternatively, TCSS 462 project teams can submit a 10-15 minute presentation, similar to the Cloud Technology and/or Research paper presentations, that captures all of the same content as the term paper. Teams with a mix of TCSS 462 and TCSS 562 students should submit a term project report. Each team should have conducted one or more case studies to examine trade-offs of alternate application design decisions. Trade-offs are evaluated using performance metrics such as runtime, throughput (KB/sec, row/sec), latency (sec), and cost to quantify results of the different designs.

Please use the provided ACM template to format the term project report.

The template can be found here:

MS Word Template:
https://faculty.washington.edu/wlloyd/courses/tcss562/project/acm-word-template-f2023.docx

Overleaf Template:
https://www.overleaf.com/latex/templates/acm-conference-proceedings-primary-article-template/wbvnghjbzwpc

PDF Template:
https://faculty.washington.edu/wlloyd/courses/tcss562/project/acm-word-template-f2023.pdf

Template Instructions:
https://faculty.washington.edu/wlloyd/courses/tcss562/project/acm-word-template-f2023-instructions.docx

For the original ACM Latex template, or for the source template files, see this website:
https://www.acm.org/publications/proceedings-template
For editing in Latex the use of Overleaf is recommended: https://www.overleaf.com/.

The Template Instructions describe how to approach writing each section of the paper and what to include. Please review the Template Instructions for suggestions on how to assemble your research paper. The major sections are:

I. Introduction
   A. Research Questions (Case Study Questions)

        i. Research Question #1 (RQ-1)
        ii. Research Question #2 (RQ-2)
II. Comparison Study
    A. Design Tradeoffs
    B. Application Implementation
    C. Experimental Approach
III. Experimental Results
    A. Results of experiments for RQ-1
    B. Results of experiments for RQ-2
    C. Analysis and Discussion of Results
IV. Conclusions
    A. Summary
    B. Future Work – if applicable
V. References

In TCSS 462/562, we focused on implementing a serverless application and conducting a case study to compare alternate design tradeoffs. After building the initial serverless application, the case study evaluation involved running experiments to evaluate performance (e.g. runtime, throughput, latency) and cost implications of the alternate system designs. The term project paper is used to capture the results of your team's work. Papers are not expected to be highly "polished" at this stage, however, they must provide a clear explanation of your project and include the relevant results.

Research Questions Examples

For the case study, research questions can be used to capture the main idea(s) that the team investigated. For example, if the team investigated serverless function composition for the TLQ data processing pipeline then a research question could be:

RQ-1: What are the performance implications measured by runtime, throughput, and latency of alternate serverless function compositions? We investigate alternate compositions of our Transform, Load, and Query data processing functions.

If serverless application control flow is the case study topic, then a research question could be:

RQ-1: What are the performance implications measured by runtime, throughput, and latency of alternate methods for serverless data processing pipeline control flow? We investigate AWS Step Functions, a client-controller, a Lambda-function controller, and event triggers as alternate methods.

Notice how each research question is followed by a sentence that provides some background about the investigation. If there are more than 1 research question, the research questions should be identified with a numbering sequence "RQ-1, RQ-2, RQ-3, …"

If using processors with different architectures is the case study topic, then a research question could be:

RQ-1: What are the performance implications measured by runtime, throughput, and latency of executing serverless functions for a data processing pipeline using x86 vs ARM-based processors?

If your case study was on daily (diurnal) performance variation of serverless functions on Amazon Cloud across multiple regions, then in your term project, you might propose the following research question:

RQ-1: What are the performance implications (e.g. runtime, latency) of executing the TLQ pipeline continuously and sequentially across different cloud regions? How does runtime and latency vary over a 24-hour period?

If your case study was on alternative programming languages for the TLQ pipeline use case, then your research question may be:

RQ-1: What are the performance implications (e.g. runtime, latency, throughput) of implementing an identical TLQ pipeline in different programming languages (e.g. Java, Python, and node.js) ? How does the programming language impact runtime and data processing throughput for processing large datasets?

After stating your project's research goals/objectives as a research question, the term paper should then refer to the research question throughout the paper with the designation of RQ-1 or RQ-2. The experimental approach section (II.C) should describe the experimental design used to evaluate the research question(s). The experimental results section (III) should provide detailed results for each of the research questions. The analysis section (III.C) should answer and discuss the results of the research questions. The conclusion section (IV) should summarize in short-form the key conclusions for the research questions, but it should not repeat all of the discussion in (III.C). The conclusion should be the short summary of the results (III).

Students are encouraged to refer to conference papers on the instructor's website for examples of assembling the term paper:
https://faculty.washington.edu/wlloyd/research.html#confpubs

Students can reach out to the instructor for help in writing (formulating) the research questions relative to the case study objectives provided in the earlier project proposal.

Given the compressed timeframe of the course, if your data and experiments are complete and presented well with supporting tables and graphs and the work shows promise, but the narrative in the paper simply needs proofreading, then the group will likely receive a good grade.

Groups who have produced very high quality papers will be encouraged to pursue the project further after the class and submit a paper to an IEEE or ACM workshop or conference. The instructor will work with students to craft a high quality presentation for the conference/workshop. The instructor will work to arrange travel support for students to the extent possible whose papers are accepted for publication to attend the conference. For online conferences, the instructor will make arrangements to support conference registration fees, etc. if the paper is accepted.

Presentation Option

This year, as an alternative to submitting a term project paper, **TCSS 462-only groups** can submit a presentation. Presentations should include the following: (1) link to completed Google Slides, (2) an Internet accessible video recording of the presentation, and (3) a demonstration of the working application in the video recording. Teams opting for the presentation option must include all three

items. Videos should be posted to YouTube or a publicly shared google drive, or uploaded as an mp4 file to Canvas. Zoom can be used to record a virtual meeting, and an mp4 recording can be made of the meeting to facilitate producing the video. Team members must introduce themselves and identify themselves by name in the video. Presenters should use cameras to capture video of their faces in the introduction to facilitate identifying the presenters. In the introduction, team members should briefly describe their role in the project. Use of videos of speakers faces throughout the recording is encouraged but not required, but it is required in the introduction. Each team member should have a role in the presentation and present a subset of the presentation.

Project Returned with No Grade

Teams opting for the presentation option will not receive a term project grade if any of the following occur:

- Failure to adhere to any requirement of the video presentation. This especially includes having all speakers faces included in the introduction of the video. Speakers should introduce themselves by name and describe briefly their role in the project. **Video of faces is required.**
- Failure to submit all required items: video recording, google slides, and a working demo in the video
- The video recording must be **accessible and viewable via the Internet** (Canvas submission is fine) through December 17, 2025

It is crucial that video submissions be tested and validated as working before the final deadline.

The presentation slide template follows the paper outline. The template includes comments and suggestions on how to assemble the presentation.

Google Slide Template for Project Presentation:
https://docs.google.com/presentation/d/1SDSrGsjVloWkDwt1s_8vhumAf7tPTlVe4wHhJFDbCIE/edit?usp=sharing

Peer Evaluations

A portion of the term project grade is for completing a team member peer evaluation survey on Canvas. All team members should complete this survey anonymously without sharing among the group members.

Workshop Opportunities

The timing of TCSS 462/562 works well to submit papers to a cloud computing workshop focused on performance evaluation/engineering. These papers are due around ~ February 1, 2026. Interested students should contact the instructor for additional information. These papers are either 4 pages (short) or 8 pages (full).

Hot Cloud Performance Workshop 2026: **https://hotcloudperf.spec.org/**

Another workshop known as the Workshop on **SE**rverless **S**ystems, **A**pplications, and **ME**thodologies (SESAME) is available with a ~ February 2026 submission date. Here is the website:

SESAME 2026: https://sesame26.github.io/

Questions

Please contact the instructor for questions and advice on how to approach writing the term paper or creating the presentation. The approach to writing the term paper and the presentation is a common approach which allows students to practice writing research papers and creating presentations. These skills are applicable to writing *any* research paper or presentation.

Submission Deadline

Project term papers should be submitted in PDF format on Canvas no later than 4:59am on Saturday December 13th.

Change History

Version	Date	Change
0.1	12/2/2025	Original Version