TCSS 462/562: (SOFTWARE ENGINEERING FOR) CLOUD COMPUTING

Class Presentations, Day 3

Wes J. Lloyd
School of Engineering and Technology
University of Washington – Tacoma

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OFFICE HOURS – THIS WEEK

- **THIS WEEK**
- **Tuesday: (After Quiz)**
  - 6:30 to 7:30 pm - CP 229 & Zoom
- **Thursday (After Class) :**
  - 6:00 pm to 7:00 pm – CP 229 & Zoom
- Or email for appointment

> Office Hours set based on Student Demographics survey feedback

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OBJECTIVES – 12/4

- **Questions from 12/2**
- Tutorials Questions
- Class Presentations Schedule - Cloud Technology or Research Paper Review
- Tutorial 9: AWS Step Functions, AWS SQS
- Tutorial 8: Serverless Beyond Java, Container-Based Functions
- Kubernetes

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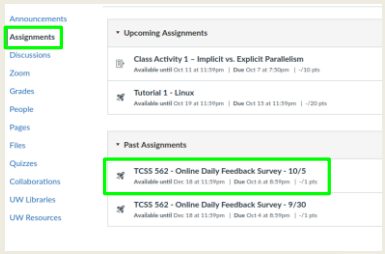
ONLINE DAILY FEEDBACK SURVEY

- Daily Feedback Quiz in Canvas – Take After Each Class
- Extra Credit for completing



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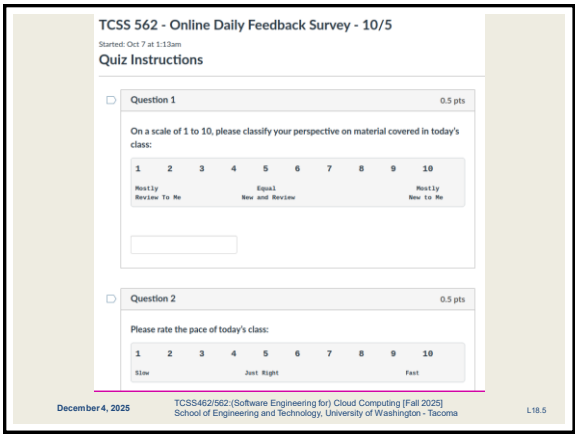

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MATERIAL / PACE

- Please classify your perspective on material covered in today's class (45 respondents, 41 in-person, 4 online):
- 1-mostly review, 5-equal new/review, 10-mostly new
- **Average – 5.30 (↓ - *previous 6.17*)**
- Please rate the pace of today's class:
- 1-slow, 5-just right, 10-fast
- **Average – 4.93 (↓ - previous 5.12)**

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FEEDBACK FROM 12/2

- ***Do TCSS 562 students need to submit peer reviews or only TCSS 462 students?***
  - TCSS 562 students deliver the presentations, so no peer reviews are required
  - TCSS 462 students submit 4 peer reviews total. They can select any of the presentations to complete the online PDF
- ***How many points is optional tutorial 9 worth ?***
  - 15 points
- ***Is Optuna open source? could I use this to tune personal models?***
  - Optuna is open source: https://optuna.org/

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TERM PROJECT SUBMISSION

- Grading time constraint: submission > Sat Dec 13th @11:59am ***not graded***
- **EXTRA CREDIT FOR EARLY SUBMISSION**
  - Submission timestamp used to determine extra credit
  - By 2pm Wednesday December 10: **+5(%) points**
  - By 2pm Thursday December 11: **+3(%) points**
  - By 2pm Friday December 12: **+1(%) point**
- GROUPS SHOULD SUBMIT A TERM PAPER OR PRESENTATION NOT BOTH
- The following submissions are required:
- 1. (**TCSS 562**) PDF of the term paper
- 2. (**TCSS 462**) PDF of the term project slides, URL to Google slides, or ppt/pptx file
- 3. (**TCSS 462**) Video recording of project presentation (at least one of the following: mp4 file, link to YouTube video, link to mp4 file hosted on Google Drive, or link to Zoom recording)
- 4. (**TCSS 462/562**) complete project source code - tar.gz or zip file

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TUTORIAL 7 – DEC 4

- Introduction to Docker
- https://faculty.washington.edu/wlloyd/courses/tcss562/tutorials/TCSS462_562_f2025_tutorial_7.pdf
- Must complete using c7i-flex.large ec2 instance & Ubuntu 24.04 (for cgroups v2)
- Use DOCX file for copying and pasting Docker install commands
- Topics:
  - Installing Docker
  - Creating a container using a Dockerfile
  - Using cgroups virtual filesystem to monitor CPU utilization of a container
  - Persisting container images to Docker Hub image repository
  - Container vertical scaling of CPU/memory resources
  - Testing container CPU and memory isolation

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GROUP PRESENTATIONS

- TWO OPTIONS:
- ***Cloud technology presentation***
- ***Cloud research paper presentation***
  - Recent & suggested papers will be posted at: http://faculty.washington.edu/wlloyd/courses/tcss562/papers/
- **Presentation dates:**
  - Tuesday November 25
  - Tuesday December 2, Thursday December 4
- **Peer Reviews**
  - Word DOCX review form posted, fill out, submit PDF on Canvas
  - Feedback shared with groups
  - TCSS 462: submit 4 total peer reviews in lieu of a group presentation

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GROUP PRESENTATIONS

- 7 Presentation Teams
- 3 Cloud Technology Talks
- 4 Cloud Research Paper Presentations
- 1 one-person teams
- 2 two-person teams
- 4 three-person teams

- Thank you for the submissions

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PRESENTATION SCHEDULE

- **<Tuesday November 25>**

1. Team 4: Xiaoling Wei, Bohan Xiong, Xu Zhu
Research paper: ***Serverless Replication of Object Storage across Multi-Vendor Clouds and Regions***
2. Team 1: William Hay
Cloud Technology: ***Amazon Athena***
3. *Robert Cordingly – Original Research Paper:* ***Sky Computing for Serverless: Infrastructure Assessment to Support Performance Enhancement*** *(IEEE/ACM UCC 2025 Practice Talk)*

- **<Tuesday December 2>**

1. Team 5: Sparsha Jha, Chris Biju
Cloud Technology: ***Intelligent Optimization of Distributed Pipeline Execution in Serverless Platforms: A Predictive Model Approach***

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PRESENTATION SCHEDULE - 2

- **<Thursday December 4>**

1. Team 3: Jiameng Li, Naomi Nottingham, Headley Brissett
Research paper: ***A Perfect Fit? – Towards Containers on Microkernels***
2. Team 2: Ruby Plangphatthanaphanit, Junjia Li, Ari Yin
Cloud Technology: ***CI/CD in the Cloud (GitHub Actions + Cloud Deploy)***
3. Team 8: Aamena Suzzane, Dhruva Bhat
Research paper: ***CoFaaS: Automatic Transformation-based Consolidation of Serverless Functions***
4. Team 6: Han Zhang, Sahil Bhatt, Pengcheng Cao
Cloud Technology: ***AWS Amplify***

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TUTORIAL 9 – TO BE POSTED

- Introduction to AWS Step Functions and Amazon Simple Queue Service (SQS)
- **Not Required**, available for **EXTRA CREDIT** (scored out of 0)
  - Adds up to 15 points to overall tutorials score

- Tasks
  - Adapt Caesar Cipher Lambda functions for use with AWS Step Functions
  - Create AWS Step Functions State Machine
  - Create a BASH client to invoke the AWS Step Function
  - Create Simple Queue Service Queue for messages
  - Add message to SQS queue from AWS Lambda function
  - Modify AWS Step Function Bash client script to retrieve AWS Step Function result from SQS queue

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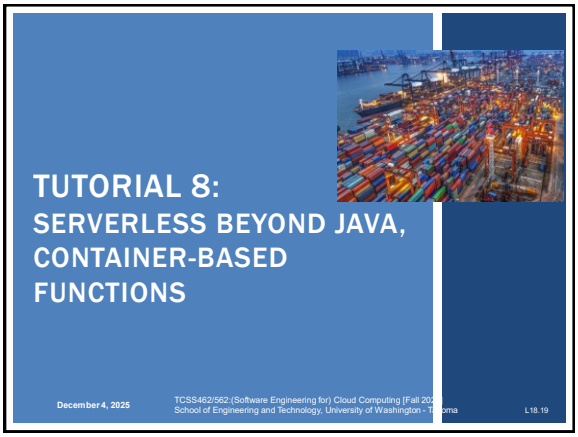
TUTORIAL 8:
SERVERLESS BEYOND JAVA, CONTAINER-BASED FUNCTIONS
December 4, 2025
TCSS462/562:(Software Engineering for) Cloud Computing [Fall 202
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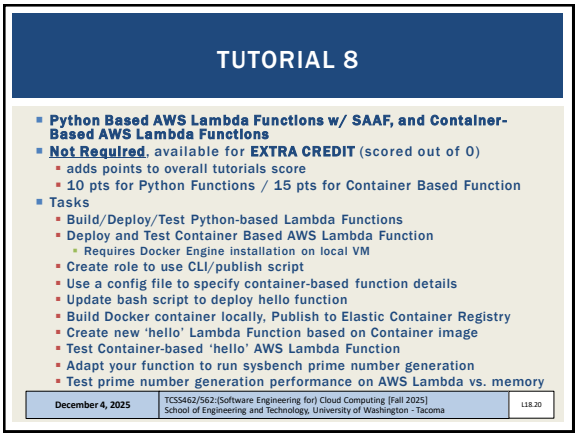
TUTORIAL 8
Python Based AWS Lambda Functions w/ SAAF, and Container-Based AWS Lambda Functions
Not Required, available for EXTRA CREDIT (scored out of 0)
adds points to overall tutorials score
10 pts for Python Functions / 15 pts for Container Based Function
Tasks
Build/Deploy/Test Python-based Lambda Functions
Deploy and Test Container Based AWS Lambda Function
Requires Docker Engine installation on local VM
Create role to use CLI/publish script
Use a config file to specify container-based function details
Update bash script to deploy hello function
Build Docker container locally, Publish to Elastic Container Registry
Create new 'hello' Lambda Function based on Container image
Test Container-based 'hello' AWS Lambda Function
Adapt your function to run sysbench prime number generation
Test prime number generation performance on AWS Lambda vs. memory
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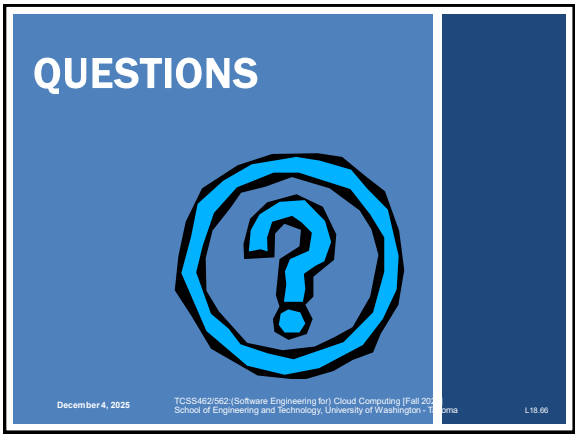
QUESTIONS
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