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

Class Presentations, Day 3

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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**

Announcements
Assignments
Discussions
Zoom
Grades
People
Pages
Files
Quizzes
Collaborations
UW Libraries
UW Resources

▼ Upcoming Assignments

Class Activity 1 – Implicit vs. Explicit Parallelism
Available until Oct 11 at 11:59pm | Due Oct 7 at 7:50pm | -/10 pts

Tutorial 1 - Linux
Available until Oct 19 at 11:59pm | Due Oct 15 at 11:59pm | -/20 pts

▼ Past Assignments

TCSS 562 - Online Daily Feedback Survey - 10/5
Available until Dec 18 at 11:59pm | Due Oct 6 at 8:59pm | -/1 pts

TCSS 562 - Online Daily Feedback Survey - 9/30
Available until Dec 18 at 11:59pm | Due Oct 4 at 8:59pm | -/1 pts

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TCSS 562 - Online Daily Feedback Survey - 10/5

Started: Oct 7 at 1:13am

Quiz Instructions

Question 1   0.5 pts

On a scale of 1 to 10, please classify your perspective on material covered in today's class:

1	2	3	4	5	6	7	8	9	10

Mostly
Review To Me   Equal New and Review   Mostly New to Me

Question 2   0.5 pts

Please rate the pace of today's class:

1	2	3	4	5	6	7	8	9	10

Slow   Just Right   Fast

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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 ($\downarrow$ - *previous 6.17*)**

- Please rate the pace of today's class:
- 1-slow, 5-just right, 10-fast
- **Average – 4.93 ($\downarrow$ - *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

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TUTORIAL 8

- **Python Based AWS Lambda Functions w/ SAAF, and Container-Based AWS Lambda Functions**
- **<u>Not Required</u>**, 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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