

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

## Team 2 Presentation

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## OFFICE HOURS – FALL 2024

- **THIS WEEK**
- **Tuesday:**
  - 2:30 to 3:30 pm - CP 229
- **Friday:**
  - 1:00 to 2:00 pm - Zoom

> *Office Hours set based on Student Demographics survey feedback*

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## OBJECTIVES - 12/3

- **Questions from 11/26**
- Tutorials Questions
- Class Presentations Schedule -  
Cloud Technology or Research Paper Review
- Tutorial 8: AWS Step Functions, AWS SQS
- Term Project Report / Presentation

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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 (**41** respondents):
  - 1-mostly review, 5-equal new/review, 10-mostly new
  - **Average - 5.66** (↓ - *previous 6.61*)
- Please rate the pace of today's class:
  - 1-slow, 5-just right, 10-fast
  - **Average - 5.15** (↓ - *previous 5.23*)
- **Response rates:**
  - TCSS 462: 27/41 - 65.9%
  - TCSS 562: 14/20 - 70.0%

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## FEEDBACK FROM 11/26

- **I am a bit confused on containers sharing kernels and isolation. On the "What is a container?" slide, that shows Operating System containerization and Application containerization both are described as sharing a kernel**
- **How would the isolation be different between the two if that is the case ?**
- Both operating system containerization and application containerization sharing an underlying OS kernel
- OS containers are will generally run more processes, all the processes of a full OS instance
- In multi-tenant scenarios running many OS containers may lead to greater resource contention than Application containers because they require more resources
  - Application containers are stripped down to only run processes specific to the application – OS-level processes are not duplicated

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## AWS CLOUD CREDITS UPDATE

- **AWS CLOUD CREDITS ARE NOW AVAILABLE FOR TCSS 462/562**
- **Credit codes must be securely exchanged**
- **Request codes by sending an email with the subject "AWS CREDIT REQUEST" to [wllloyd@uw.edu](mailto:wllloyd@uw.edu)**
- **Codes can also be obtained in person (or zoom), in the class, during the breaks, after class, during office hours, by appt**
  - **58 credit requests fulfilled as of Nov 25 @ 11:59p**
- **Codes not provided using discord**

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**Don't Forget to Terminate (Shutdown)  
all EC2 instances for Tutorials 3 & 7**

**Tutorial 3 spot instance:  
c5d.large instance @ ~3.2 cents / hour**

**\$0.78 / day  
\$5.48 / week  
\$23.78 / month  
\$285.42 / year**

**AWS CREDITS → → → → → → → →**



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**OBJECTIVES - 12/3**

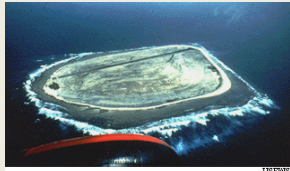
- Questions from 11/26
- **Tutorials Questions**
- Class Presentations Schedule -  
Cloud Technology or Research Paper Review
- Tutorial 8: AWS Step Functions, AWS SQS
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## TUTORIAL SUBMISSION TIME

- Tutorials can now be submitted on the due date until the very last minute of the day **Anywhere-on-Earth (AOE)**
  - Equivalent to **4:59 AM Pacific Standard Time (PST)**
- Anywhere-on-Earth timezone: **Baker Island, Pacific Ocean**
- <https://www.timeanddate.com/time/zones/aoe>
- Uninhabited island in Pacific Ocean
- Coordinates            0° 11' 45" N 176° 28' 45" W
- Area                    2.1 km<sup>2</sup> (0.81 sq mi)
- Length                1.81 km (1.125 mi)
- Width                 1.13 km (0.702 mi)
- Coastline             4.8 km (2.98 mi)
- Highest elevation    8 m (26 ft)
- Population            0 (2000)



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## TUTORIAL 6 – NOV 29 AOE

- Introduction to Lambda III: Serverless Databases
- [https://faculty.washington.edu/wlloyd/courses/tcss562/tutorials/TCSS462\\_562\\_f2024\\_tutorial\\_6.pdf](https://faculty.washington.edu/wlloyd/courses/tcss562/tutorials/TCSS462_562_f2024_tutorial_6.pdf)
- Create and use Sqlite databases using sqlite3 tool
- Deploy Lambda function with Sqlite3 database under /tmp
- Compare in-memory vs. file-based Sqlite DBs on Lambda
- Create an Amazon Aurora “Serverless” v2 MySQL database
- Using an ec2 instance in the same VPC (Region + availability zone) connect and interact with the database using the mysql CLI app
- Deploy an AWS Lambda function that uses the MySQL “serverless” database

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## TUTORIAL 7 – DEC 1 AOE

- Introduction to Docker
- [https://faculty.washington.edu/wlloyd/courses/tcss562/tutorials/TCSS462\\_562\\_f2023\\_tutorial\\_7.pdf](https://faculty.washington.edu/wlloyd/courses/tcss562/tutorials/TCSS462_562_f2023_tutorial_7.pdf)
- Complete tutorial using Ubuntu 22.04 (for cgroups v2)
- Complete using **c5.large ec2 instance** (for consistency)
- 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 28, Tuesday November 30
  - Tuesday December 5, Thursday December 7
- **Peer Reviews**
  - Word DOCX form will be provided, fill out, submit PDF on Canvas
  - Feedback shared with groups
  - TCSS 462: 1 review/day required, additional are extra credit
  - TCSS 562: same as 462, but no peer review req'd on day of your talk

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## GROUP PRESENTATIONS

- **10 Presentation Teams**
- **3 Cloud Technology Talks**
- **7 Cloud Research Paper Presentations**
- **3 one-person teams**
- **4 two-person teams**
- **3 three-person teams**
  
- **Thank you for the submissions**

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## PRESENTATION SCHEDULE

- **<Tuesday November 26>**
  1. **Team 3:** Soumith Kondubhotla, Siva Srinivasa Aditya, Sri Mylavarapu Research paper: **Sandboxing Functions for Efficient and Secure Multi-tenant Serverless Deployments**
  2. **Team 7:** Mingzhi Ma, Derry Cheng, Aaron Chen  
Research paper: **Serverless? RISC more!**
  3. **Team 5:** Ishwarya Narayana Subramanian, Thanvi Yadav Sirla  
Cloud Technology: **MiniKube**
  4. **Team 12:** Steven Golob  
Research paper: **Tiny Autoscalers for Tiny Workloads: Dynamic CPU Allocation for Serverless Functions**
- **<Tuesday December 3>**
  1. **Team 2:** Andrew Nguyen, Pavel Braginskiy  
Cloud Technology: **AWS Amplify**

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## PRESENTATION SCHEDULE - 2

- **<Thursday December 5>**
  1. **Team 4:** Viktoria Dolojan and Carla Peterson  
Research paper: **FootPrinter: Quantifying Data Center Carbon Footprint**
  2. **Team 10:** Andrew Jang, Shrey Srivastava, Naga  
Cloud Technology: **SageMaker: training configurations**
  3. **Team 11:** Roark Zhang  
Research paper: **Process-as-a-Service: Unifying Elastic and Stateful Clouds with Serverless Processes**
  4. **Team 14:** Sanya Sinha, Jackson Davis  
Research paper: **Goldfish: Serverless Actors with Short-Term Memory State for the Edge-Cloud Continuum**
  5. **Team 15:** Jackson Goldberg  
Research paper: **Harmonizing Efficiency and Practicability: Optimizing Resource Utilization in Serverless Computing with Jiagu**

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OBJECTIVES - 12/3		
<ul style="list-style-type: none"><li>▪ Questions from 11/26</li><li>▪ Tutorials Questions</li><li>▪ Class Presentations Schedule - Cloud Technology or Research Paper Review</li><li>▪ <b>Tutorial 8: AWS Step Functions, AWS SQS</b></li><li>▪ Term Project Report / Presentation</li></ul>		
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TUTORIAL 8 - DEC 12 (FIRM)		
<ul style="list-style-type: none"><li>▪ Introduction to AWS Step Functions and Amazon Simple Queue Service (SQS)</li><li>▪ Not Required, available for extra credit<ul style="list-style-type: none"><li>▪ adds points to overall tutorials score</li></ul></li><li>▪ <a href="https://faculty.washington.edu/wlloyd/courses/tcss562/tutorials/TCSS462_562_f2024_tutorial_8.pdf">https://faculty.washington.edu/wlloyd/courses/tcss562/tutorials/TCSS462_562_f2024_tutorial_8.pdf</a></li><li>▪ Tasks<ul style="list-style-type: none"><li>▪ Adapt Caesar Cipher Lambda functions for use with AWS Step Functions</li><li>▪ Create AWS Step Functions State Machine</li><li>▪ Create a BASH client to invoke the AWS Step Function</li><li>▪ Create Simple Queue Service Queue for messages</li><li>▪ Add message to SQS queue from AWS Lambda function</li><li>▪ Modify AWS Step Function Bash client script to retrieve AWS Step Function result from SQS queue</li></ul></li></ul>		
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## TERM PROJECT PAPER / PRESENTATION

- **EXTRA CREDIT FOR EARLY SUBMISSION:**
  - By 2pm Wednesday December 11: +5 % points
  - By 2pm Thursday December 12: +3 % points
  - By 2pm Friday December 13: +1 % points
- Submissions close Saturday December 14 @ 4:59 AM
  - No submissions after this time - can not grade project for Fall 2024
- TCSS 462 ONLY Teams can submit a presentation video, instead of a term project paper
- TCSS 562 and mixed teams submit term project paper

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## TERM PROJECT PEER REVIEWS

- **Worth 12% of the overall term project grade (4.2% of course grade)**
- Provide anonymous feedback on team members
- Based on Dr. Josh Tenenberg's team member evaluation originally designed for TCSS 360
- Every team member must submit for team to receive a term project grade
- Must be submitted on-time
- Must be submitted early for term project extra credit
- Extra credit applied for entire team or no one

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## QUESTIONS



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