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

Team 3, 7, 5, 12 Presentations

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

1

OFFICE HOURS – FALL 2024

- **THIS WEEK**
- **Tuesday:**
  - 2:30 to 3:30 pm - CP 229
- **Friday:**
  - By email appointment this week

> Office Hours set based on Student Demographics survey feedback

2

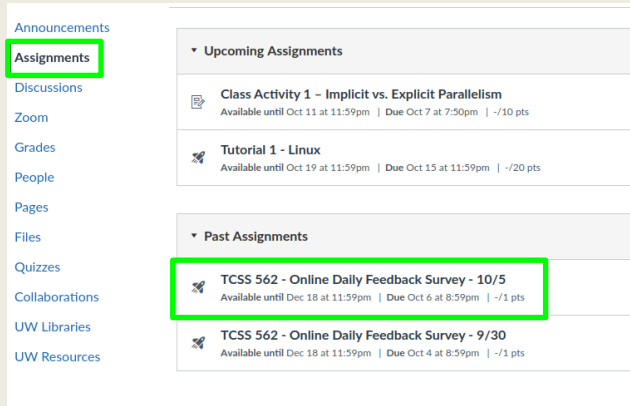
OBJECTIVES – 11/26

- **Questions from 11/21**
- Tutorials Questions
- Class Presentations Schedule -
  Cloud Technology or Research Paper Review
- Tutorial 8: AWS Step Functions, AWS SQS

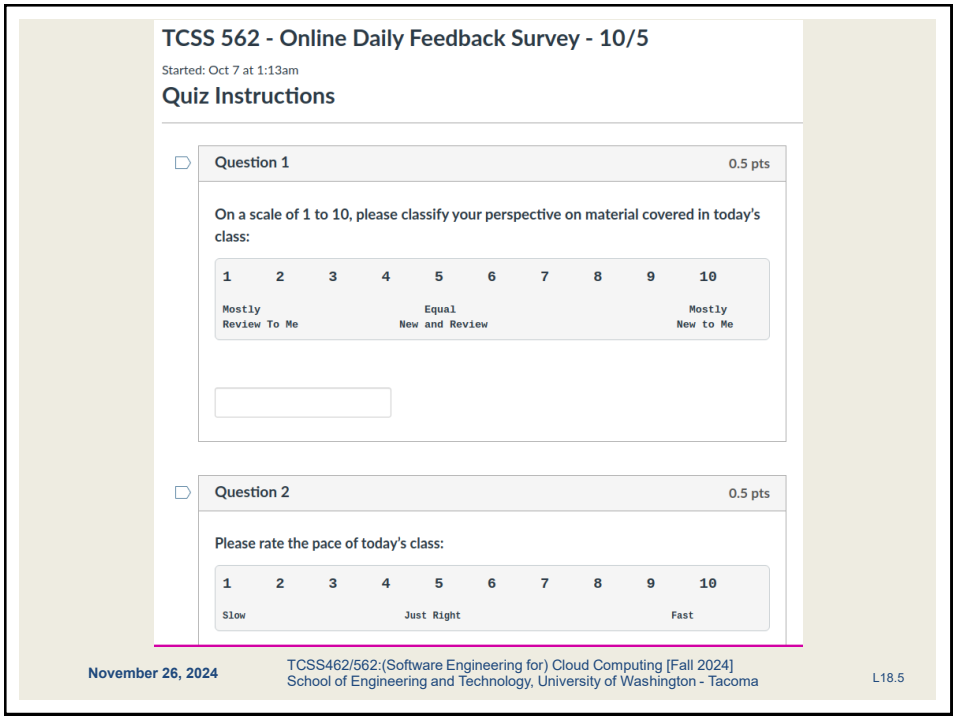
3

ONLINE DAILY FEEDBACK SURVEY

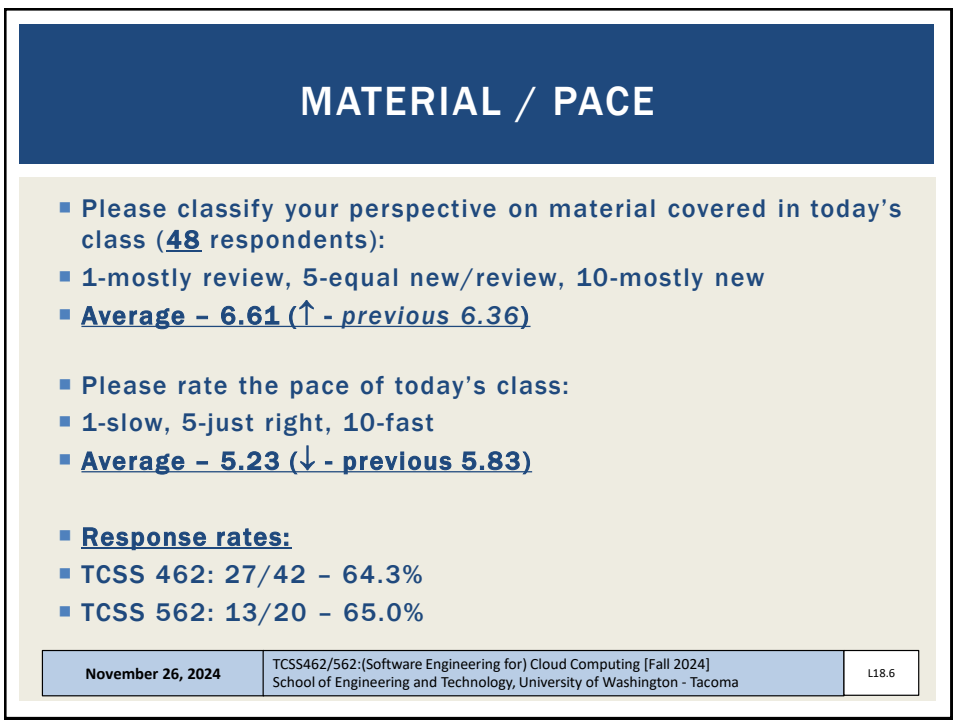
- Daily Feedback Quiz in Canvas – Take After Each Class
- Extra Credit for completing



4


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
November 26, 2024
TCSS462/562:(Software Engineering for) Cloud Computing [Fall 2024]
School of Engineering and Technology, University of Washington - Tacoma
L18.5

5


MATERIAL / PACE
Please classify your perspective on material covered in today's class (48 respondents):
1-mostly review, 5-equal new/review, 10-mostly new
Average – 6.61 (↑ - previous 6.36)
Please rate the pace of today's class:
1-slow, 5-just right, 10-fast
Average – 5.23 (↓ - previous 5.83)
Response rates:
TCSS 462: 27/42 – 64.3%
TCSS 562: 13/20 – 65.0%
November 26, 2024
TCSS462/562:(Software Engineering for) Cloud Computing [Fall 2024]
School of Engineering and Technology, University of Washington - Tacoma
L18.6

6

FEEDBACK FROM 11/21

- ..

7

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 **wlloyd@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

8

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 → → → → → → → →

9

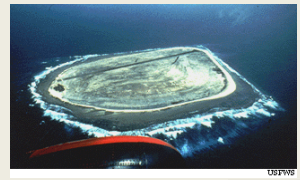
OBJECTIVES – 11/26

- Questions from 11/21
- **Tutorials Questions**
- Class Presentations Schedule - Cloud Technology or Research Paper Review
- Tutorial 8: AWS Step Functions, AWS SQS

10

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 km2 (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)



11

TUTORIAL 6 – NOV 23

- Introduction to Lambda III: Serverless Databases
- 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

12

TUTORIAL 7 – DEC 1

- Introduction to Docker
- 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

13

OBJECTIVES – 11/26

- Questions from 11/21
- Tutorials Questions
- **Class Presentations Schedule - Cloud Technology or Research Paper Review**
- Tutorial 8: AWS Step Functions, AWS SQS

14

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

15

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

16

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: ***Azure Kubernetes Service***
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***

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

OBJECTIVES – 11/26

- Questions from 11/21
- Tutorials Questions
- Class Presentations Schedule -
  Cloud Technology or Research Paper Review
- **Tutorial 8: AWS Step Functions, AWS SQS**

19

TUTORIAL 8 – DEC 12 (FIRM)

- Introduction to AWS Step Functions and Amazon Simple Queue Service (SQS)
- Not Required, available for extra credit
  - adds points to overall tutorials score
- https://faculty.washington.edu/wlloyd/courses/tcss562/tutorials/TCSS462_562_f2024_tutorial_8.pdf
- 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

20

WE WILL RETURN AT ~4:50 PM

21

QUESTIONS

48