

SER 321 A Session

SI Review Session

Monday October 2nd 2023

6:00 pm - 8:00 pm MST

Agenda



Networking Upper and Lower Layers

Programming with Sockets

Threads and Serialization

Distributed Algorithms

Middleware

SI Session Expectations

Thanks for coming to the **SER 321** SI session. We have a packed agenda and we are going to try to get through as many of our planned example problems as possible. This session will be recorded and shared with others.

- If after this you want to see additional examples, please visit the drop-in tutoring center.
- We will post the link in the chat now and at the end of the session.
 - tutoring.asu.edu
- Please keep in mind we are recording this session and it will be made available for you to review 24-48 hours after this session concludes.
- Finally, please be respectful to each other during the session.

Interact with us:

Zoom Features



Zoom Chat

- Use the chat feature to interact with the presenter and respond to presenter's questions.
- Annotations are encouraged

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Preparing for the Final

Katie's Tips:

- Take advantage of the allowed reference sheet!
 - One sheet, front and back allowed
 - **Handwritten**
- Review the quizzes
 - Review the problems you struggled with
 - If you think you will forget it, add it to the sheet!
- Focus on the BIG concepts

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OSI Model

| Layer | Data Unit | What we mean |
|--------------|-----------|--------------|
| Application | Data | |
| Presentation | Data | |
| Session | Data | |
| Transport | Segments | |
| Network | Packets | |
| Data Link | Frames | |
| Physical | Bits | |

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OSI Model

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OSI - Critical Middle Layers

| Layer | Data Unit | What we mean |
|--------------|-----------|---|
| Application | Data | HTTP(s), SMTP, IMAP, POP, FTP |
| Presentation | Data | Translate, compress, encrypt |
| Session | Data | Authentication, authorization, session management |
| Transport | Segments | TCP/UDP |
| Network | Packets | IP Address, routing and delivery |
| Data Link | Frames | LLC, MAC, data transmission in LAN |
| Physical | Bits | Media Signal and Binary transmission |

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Network Layer

We already said it's responsible for "IP address, routing and delivery", but what does that mean?

- Routing and Delivery of what?
 - Packets
- Delivery to where?
 - Target address
- Connection-Oriented or Connectionless?
 - Connectionless
 - Each packet is handled individually
- Reliable or Unreliable?
 - Unreliable
 - Going to try really hard, but *no* guarantee

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Network Layer

Network: 
Subnet: 
Host: 
Port: 

Think fast! Which of the following correctly identifies the different pieces of an IP address?

A.

128.148.32.110:8080


B.

128.148.32.110:8080


C.





128.148.32.110:8080


D.

128.148.32.110:8080


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TCP vs. UDP

Starting to discuss the actual transmission here

Both have guarantees that they provide

TCP

- Reliable data transfer

- No guarantees

- Sequential delivery

UDP

- Distinguish data per port

- Three-way handshake

TCP vs. UDP

Okay, so which is which here?

- Connectionless
- Asynchronous
- Connection-oriented
- Synchronous

TCP vs. UDP

Okay, so TCP seems pretty nice. When would you use UDP?

Speed is more important than reliability

Dropped packets are not concerning - it'll get it on the next cycle

You plan to implement your own custom QOS

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Application Layer

Protocol: 

Host: 

Path: 

Query: 

Think fast! Which of the following correctly identifies the different pieces of a URL?

A.

<https://www.google.com/search?q=asu>

B.

<https://www.google.com/search?q=asu>

C.

<https://www.google.com/search?q=asu>




D.

<https://www.google.com/search?q=asu>

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Application Layer

Protocol: 
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Query: 

Think fast! Which of the following correctly identifies the different pieces of a URL?

A.

   
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`https://www.google.com/search?q=asu`

D.

   
`https://www.google.com/search?q=asu`

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Socket Programming

Can we name the three Socket Properties?

1. Location

2. Connection Semantics

3. Message Format

1. IP address, or use DNS to get the IP from the name

2. Connectionless or Connection-oriented

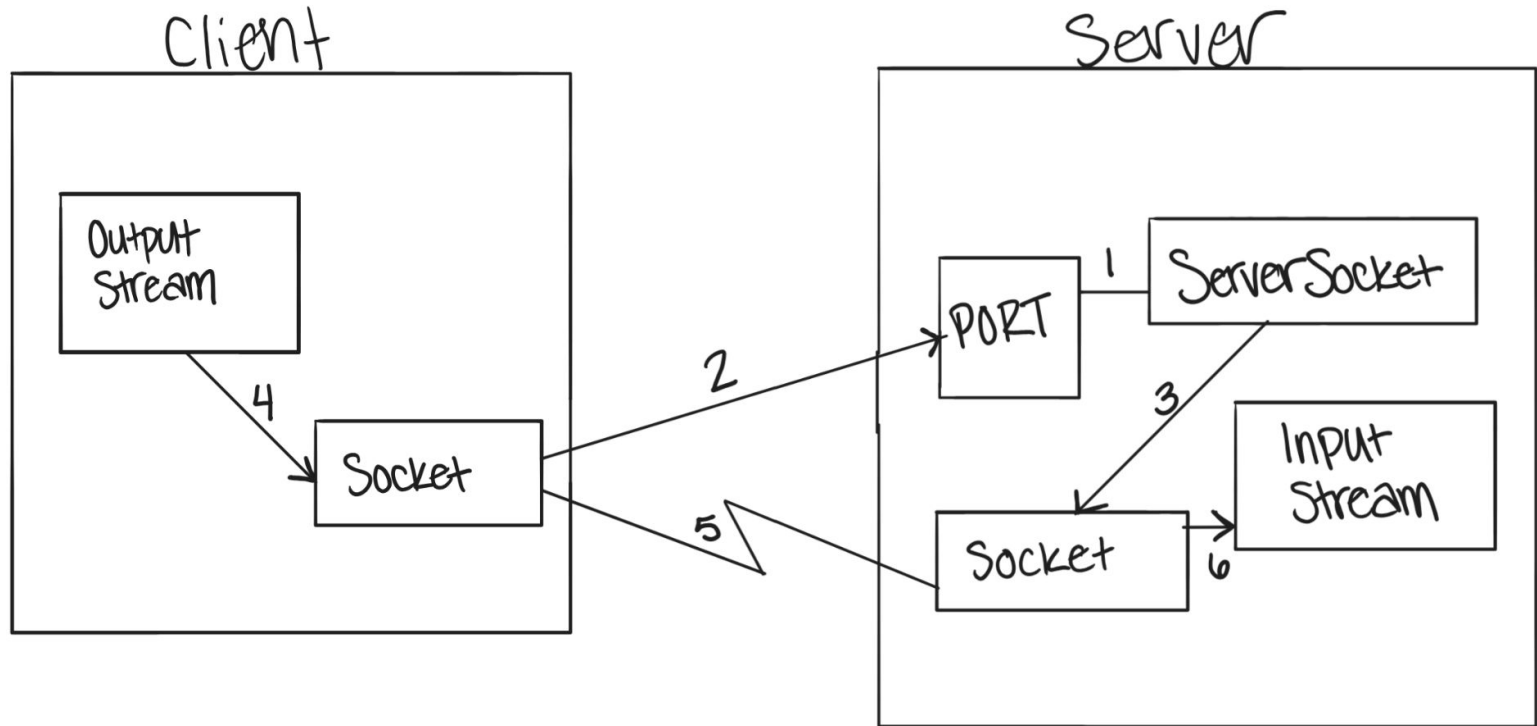
Asynchronous or Synchronous

Stateful or Stateless

3. Protocol, Error Handling, and data format

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Socket Programming



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Threads and Synchronization

Do we remember the threading pitfalls?

- Race Condition
- Starvation
- Deadlock
- One thread never gets access to the resource it needs
- A thread is only able to acquire access to part of its resources
- More than one thread accesses a single resource at one time

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Threads and Synchronization

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Threads and Synchronization

Solutions?

- Locks and Semaphores
- Atomic Variables
- Volatile Keyword
- Monitor

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What stream do I use??

Threads and Synchronization

- Buffered Streams
- Data Streams
- Object Streams

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What stream do I use??

Threads and Synchronization

- Buffered Streams Bytes
- Data Streams
- Object Streams

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What stream do I use??

Threads and Synchronization

- Buffered Streams

Bytes

- Data Streams

Primitive Data Types

- Object Streams

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What stream do I use??

Threads and Synchronization

- Buffered Streams Bytes
- Data Streams Primitive Data Types
- Object Streams Objects

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Threads and Synchronization

JSON Object or Array?

```
{
  "name" : "labREST",
  "description" : "SER421 REST API Lab",
  "dependencies": {
    "apidoc": "^1.2.0"
  },
  "apidoc" : {
    "title" : "labREST kgrinne3",
    "url" : "http://localhost:8080",
    "header" : {
      "title" : "Introduction",
      "filename" : "README.md"
    },
    "template" : {
      "showRequiredLabels" : true
    }
  }
}
```

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Threads and Synchronization

JSON Object or Array?

```
[
  {
    "category": "Science: Computers",
    "type": "multiple",
    "difficulty": "easy",
    "question": "In web design, what does CSS stand for?",
    "correct_answer": "Cascading Style Sheet",
    "incorrect_answers": [
      "Counter Strike: Source",
      "Corrective Style Sheet",
      "Computer Style Sheet"
    ]
  },
  {
    "category": "Science: Computers",
    "type": "multiple",
    "difficulty": "easy",
    "question": "What amount of bits commonly equals one byte?",
    "correct_answer": "8",
    "incorrect_answers": [
      "1",
      "2",
      "64"
    ]
  }
]
```

Can we list the issues?

- Nodes fail
- Latency
- Network communication failures
- Common and/or shared resources
- Deadlocks
- Execution safety - no bad stuff
- Liveness - everyone goes eventually

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Distributed Algorithms

Should we always distribute the workload?

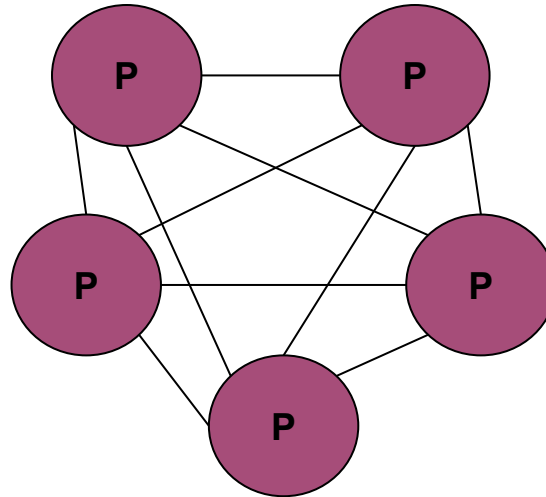
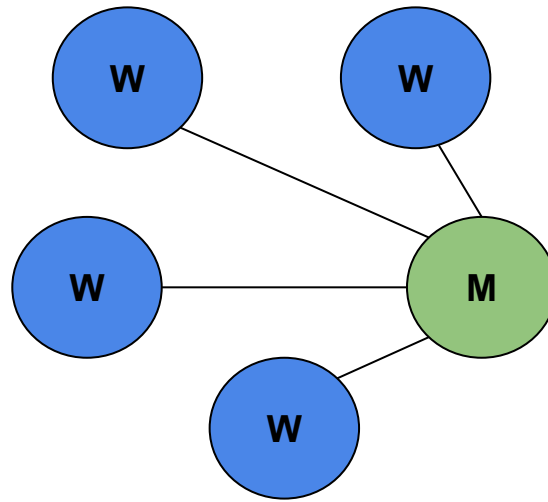
No!

Think XXXXXL!

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Distributed Structures

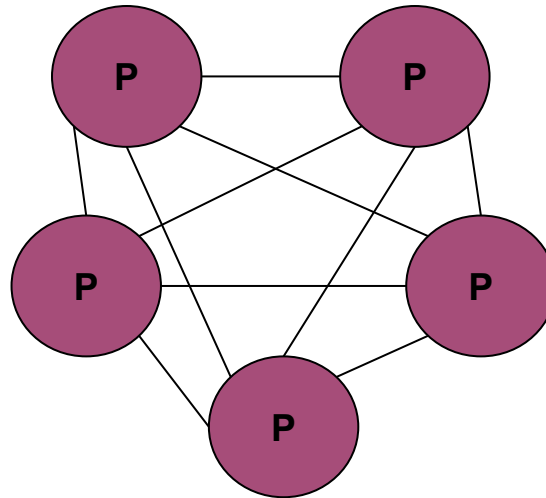
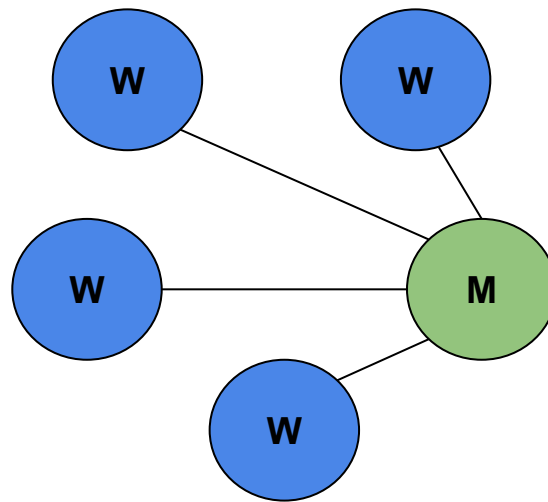
What are we looking at?



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Distributed Structures

Can we list some pros of both?

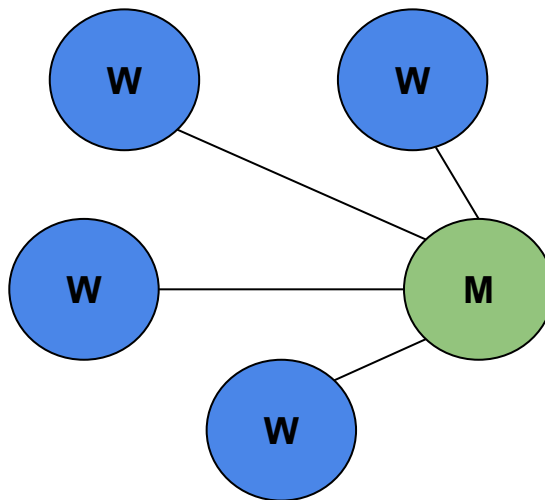


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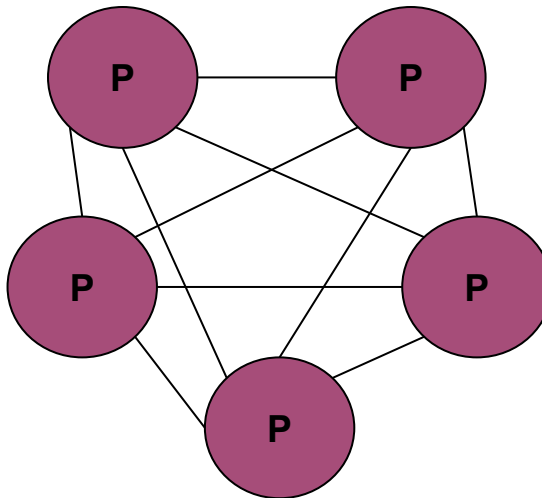
Distributed Structures

Can we list some pros of both?

- Simple setup
- Logic is isolated
- Communication is linear



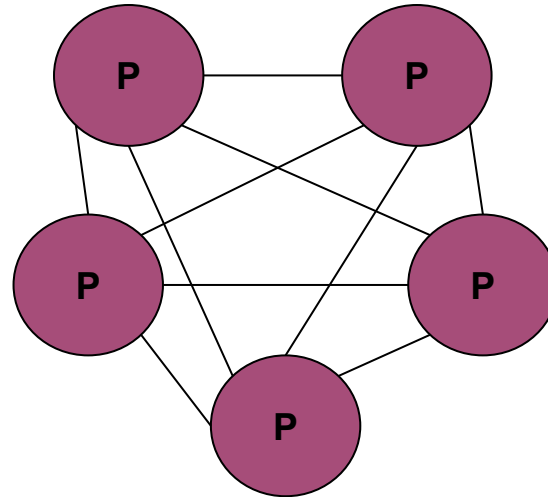
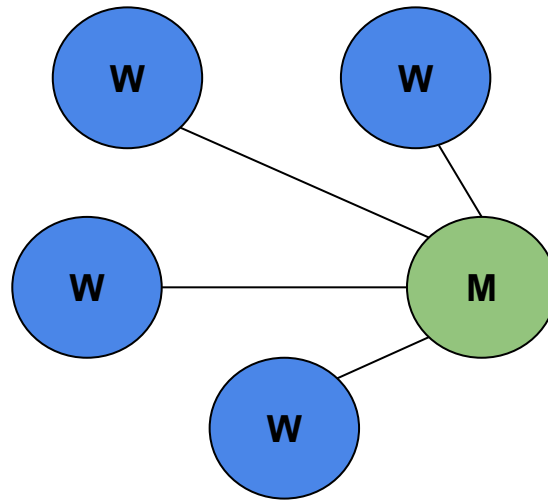
- Peers can join easily
- Peers can (and do) fail without issue
- Peers are all equal



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Distributed Structures

What about cons?

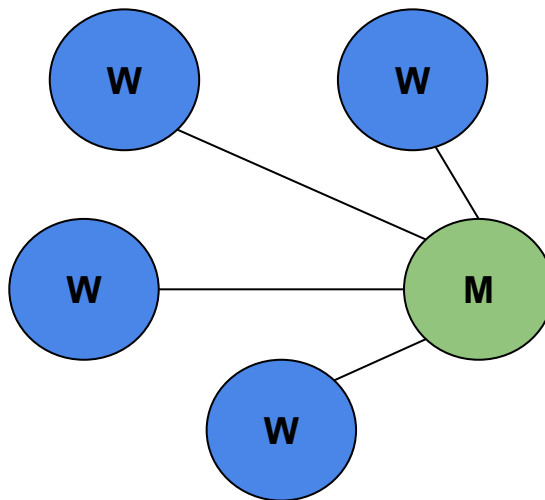


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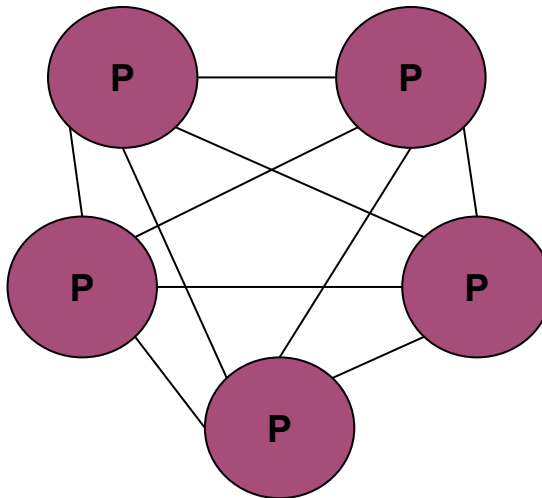
Distributed Structures

What about cons?

- Some nodes are more important
- Single point of failure



- Client connections are different
- Communication is complicated

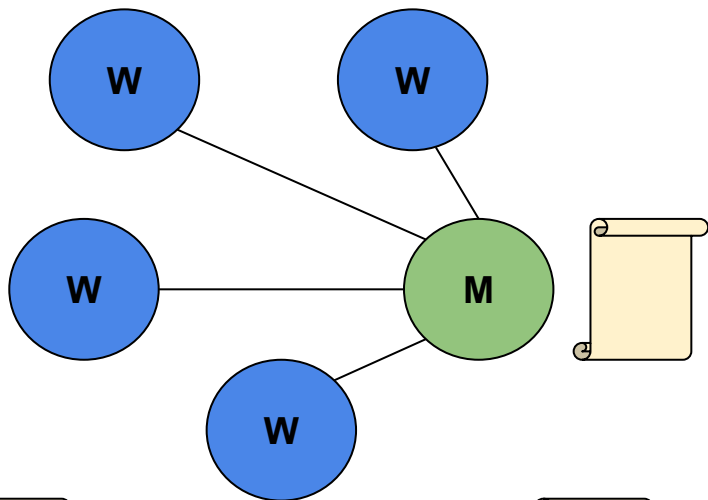


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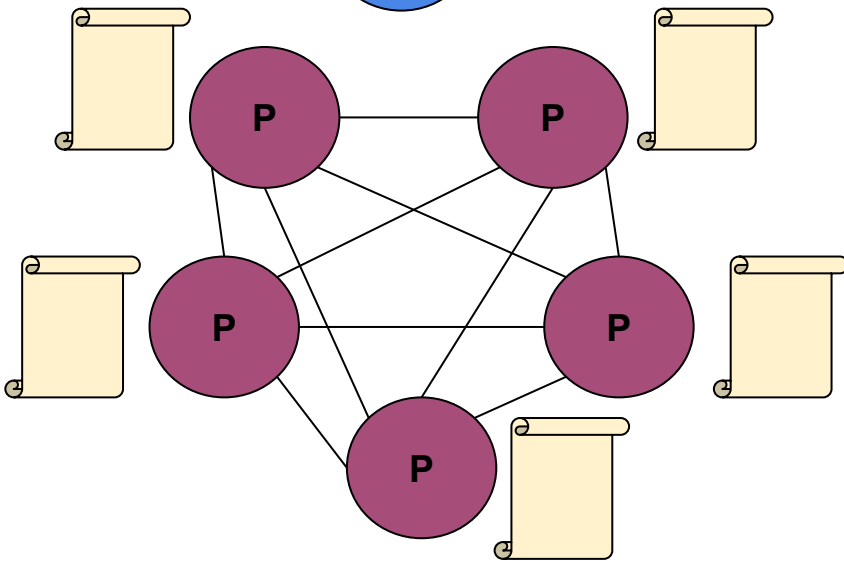
Distributed Structures

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Middleware

What is it?

The cool stuff!

Glue between client and server

Interface for communication

Think API

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Middleware

Benefits?

- Agility
- Efficiency
- Portability
- Reusability
- Cost Effectiveness

Questions?

Survey:

https://bit.ly/asn_survey



Upcoming Events

Final Exam

Opens: Wednesday October 4th

Closes: Friday October 6th at 11:59 pm MST

Good Luck!
You got this!

More Questions?

Check out our other resources!

tutoring.asu.edu



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Online peer communities for students and tutors, YouTube channels, and Tutorbots.



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Individual courses have an online peer community that allows you to connect with your peers to post and answer questions and to develop study groups.



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 [Peer Community](#)

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Uses of Accounting Info II

 [Peer Community](#)

CIS 105

Computer Applications and Information Technology

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