

SER 321 B Session

SI Session

Thursday, April 18th 2024

7:00 pm - 8:00 pm MST

Agenda



Peer To Peer Communication

Revisit Process

SimplePeerToPeer

RAFT

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



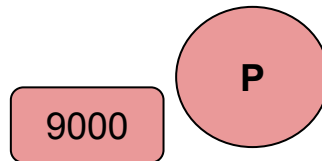
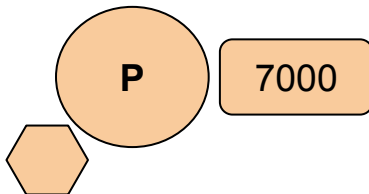
SER 321

Communication

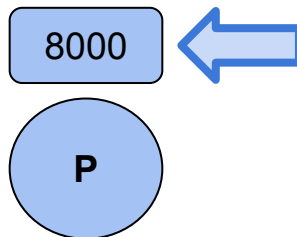
Remember that the OS allocates a new port for the client socket!

Run With:

```
gradle runPeer --args "Name Port"
```



We are going to take a closer look at the code in a moment!

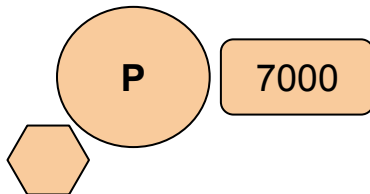


```
gradle runPeer --args "Peer8000 8000"
```

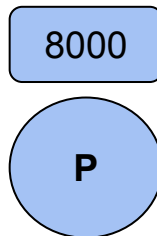
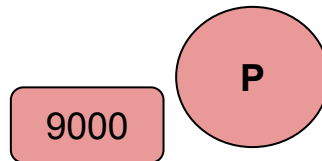
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Communication

```
gradle runPeer --args "Peer7000 7000"
```



```
> Task :runPeer
Hello Peer7000 and welcome! Your port will be 7000
> Who do you want to listen to? Enter host:port
<=====--> 75% EXECUTING [21s]
> :runPeer
█
```



```
> Task :runPeer
Hello Peer8000 and welcome! Your port will be 8000
> Who do you want to listen to? Enter host:port
<=====--> 75% EXECUTING [21s]
> :runPeer
█
```

```
gradle runPeer --args "Peer8000 8000"
```

SER 321

Communication

```
gradle runPeer --args "Peer7000 7000"
```

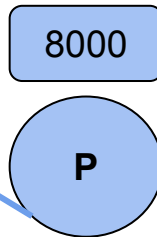
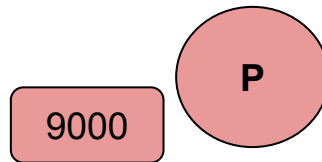
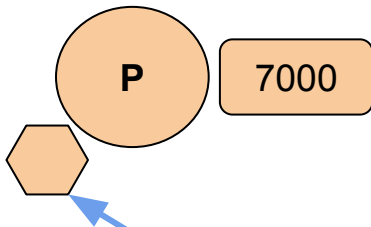
```
> Task :runPeer
```

```
Hello Peer7000 and welcome! Your port will be 7000
```

```
> Who do you want to listen to? Enter host:port
```

```
<=====--> 75% EXECUTING [21s]
```

```
> :runPeer
```



```
> Task :runPeer
```

```
Hello Peer8000 and welcome! Your port will be 8000
```

```
> Who do you want to listen to? Enter host:port
```

```
<<==<==<==<==<==<=====----> 75% EXECUTING [1m 56s]
```

```
> You can now start chatting (exit to exit)
```

```
<=====--> 75% EXECUTING [2m 3s]
```

```
> :runPeer
```

SER 321 Communication

What will
happen?

```
> Task :runPeer
Hello Peer7000 and welcome! Your port will be 7000
> Who do you want to listen to? Enter host:port
<===== > 75% EXECUTING [21s]
> :runPeer
█
```

```
> Task :runPeer
Hello Peer8000 and welcome! Your port will be 8000
> Who do you want to listen to? Enter host:port
<===== > 75% EXECUTING [1m 56s]
> You can now start chatting (exit to exit)
<===== > 75% EXECUTING [3m 33s]
<===== > 75% EXECUTING [3m 37s]
hi 7000
```

```
PS C:\ASU\SER321\examples_repo\ser321examples\Sockets\S
Starting a Gradle Daemon, 1 busy and 1 stopped Daemons
```

```
> Task :runPeer
Hello Peer7000 and welcome! Your port will be 7000
> Who do you want to listen to? Enter host:port
<===== > 75% EXECUTING [2m 48s]
> :runPeer
█
```

Why?

9000

P

8000

P

```
> Task :runPeer
Hello Peer8000 and welcome! Your port will be 8000
> Who do you want to listen to? Enter host:port
<===== > 75% EXECUTING [1m 56s]
> You can now start chatting (exit to exit)
<===== > 75% EXECUTING [3m 13s]
> :runPeer
hi 7000
```

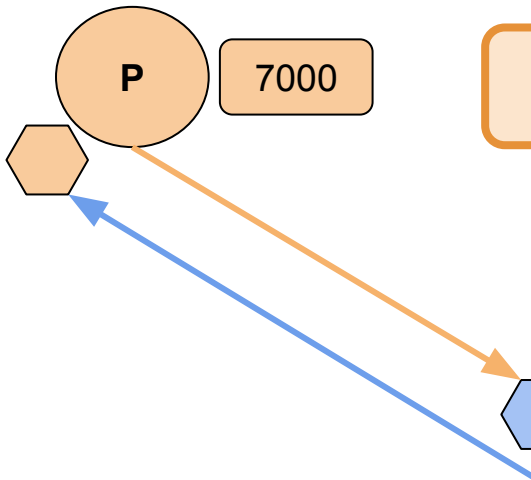

Communication

```
> Task :runPeer  
Hello Peer8000 and welcome! Your port will be 8000  
> Who do you want to listen to? Enter host:port  
<====<<=====<=<=<=====-----> 75% EXECUTING [3m 4s]  
> You can now start chatting (exit to exit)  
[Peer7000]: Hi Peer8000!  
<=====-----> 75% EXECUTING [4m 4s]  
> :runPeer  

```

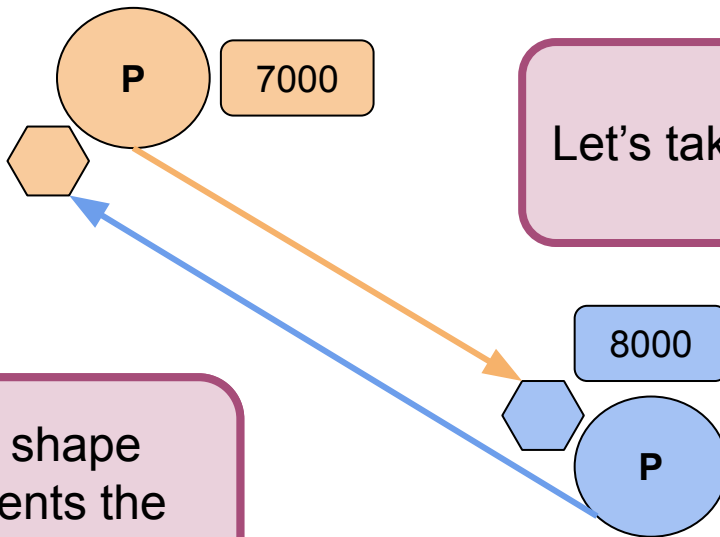
```
PS C:\ASU\SER321\examples_repo\ser321examples\Sockets\
```

```
> Task :runPeer  
Hello Peer7000 and welcome! Your port will be 7000  
> Who do you want to listen to? Enter host:port  
<<<====<==<===<=====-----> 75% EXECUTING [3m 43s]  
> You can now start chatting (exit to exit)  
<<<=<===<==<=<=====-----> 75% EXECUTING [3m 58s]  
<=====-----> 75% EXECUTING [4m 1s]  
Hi Peer8000!
```



Communication

localhost:8000



What shape represents the **ClientThread**?

```
> :runPeer
```

SimplePeerToPeer

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Communication

ServerThread

```
public class ServerThread extends Thread {  
    2 usages  
    private ServerSocket serverSocket;  
    2 usages  
    private Set<Socket> listeningSockets = new HashSet<>();  
  
    1 usage  
    public ServerThread(String portNum) throws IOException {  
        serverSocket = new ServerSocket(Integer.valueOf(portNum));  
    }  
  
    | Starting the thread, we are waiting for clients wanting to talk to us, then save the socket in a list  
  
    public void run() {  
        try {  
            while (true) {  
                Socket sock = serverSocket.accept();  
                listeningSockets.add(sock);  
            }  
        } catch (Exception e) { ... }  
    }  
  
    | Sending the message to the OutputStream for each socket that we saved  
  
    1 usage  
    void sendMessage(String message) {  
        try {  
            for (Socket s : listeningSockets) {  
                PrintWriter out = new PrintWriter(s.getOutputStream(), true);  
                out.println(message);  
            }  
        } catch (Exception e) { ... }  
    }  
}
```

```
public static void main (String[] args) throws Exception {
```

```
    BufferedReader bufferedReader = new BufferedReader(new InputStreamReader(System.in));  
    String username = args[0];  
    System.out.println("Hello " + username + " and welcome! Your port will be " + args[1]);  
  
    // starting the Server Thread, which waits for other peers to want to connect  
    ServerThread serverThread = new ServerThread(args[1]);  
    serverThread.start();  
    Peer peer = new Peer(bufferedReader, args[0], serverThread);  
    peer.updateListenToPeers();
```

Peer

ClientThread

```
public class ClientThread extends Thread {  
    2 usages  
    private BufferedReader bufferedReader;  
  
    1 usage  
    public ClientThread(Socket socket) throws IOException {  
        bufferedReader = new BufferedReader(new InputStreamReader(socket.getInputStream()));  
    }  
  
    public void run() {  
        while (true) {  
            try {  
                JSONObject json = new JSONObject(bufferedReader.readLine());  
                System.out.println "[" + json.getString("username") + ": " + json.getString("message") + "];  
            } catch (Exception e) { ... }  
        }  
    }  
}
```

```
public class ClientThread extends Thread {  
    2 usages  
    private BufferedReader bufferedReader;  
  
    1 usage  
    public ClientThread(Socket socket) throws IOException {  
        bufferedReader = new BufferedReader(  
            (new InputStreamReader(socket.getInputStream()));  
        );  
    }  
    public void run() {  
        while (true) {  
            try {  
                JSONObject json =  
                    new JSONObject(bufferedReader.readLine());  
                System.out.println(  
                    "[" + json.getString("username") + "]: "  
                    + json.getString("message");  
            } catch (Exception e) {...}  
        }  
    }  
}
```

ClientThread

```
public static void main (String[] args) throws Exception {  
  
    BufferedReader bufferedReader = new BufferedReader(new InputStreamReader(System.in));  
    String username = null;  
    System.out.println("> Who do you want to listen to? Enter host:port");  
    String input = bufferedReader.readLine();  
    String[] setupValue = input.split(" ");  
    for (int i = 0; i < setupValue.length; i++) {  
        String[] address = setupValue[i].split(":");  
        Socket socket = null;  
        try {  
            socket = new Socket(address[0], Integer.valueOf(address[1]));  
            new ClientThread(socket).start();  
        } catch (Exception c) {  
            if (socket != null) {  
                socket.close();  
            } else {  
                System.out.println("Cannot connect, wrong input");  
                System.out.println("Exiting: I know really user friendly");  
                System.exit(0);  
            }  
        }  
    }  
    askForInput();  
}
```

Peer.updateListenToPeers

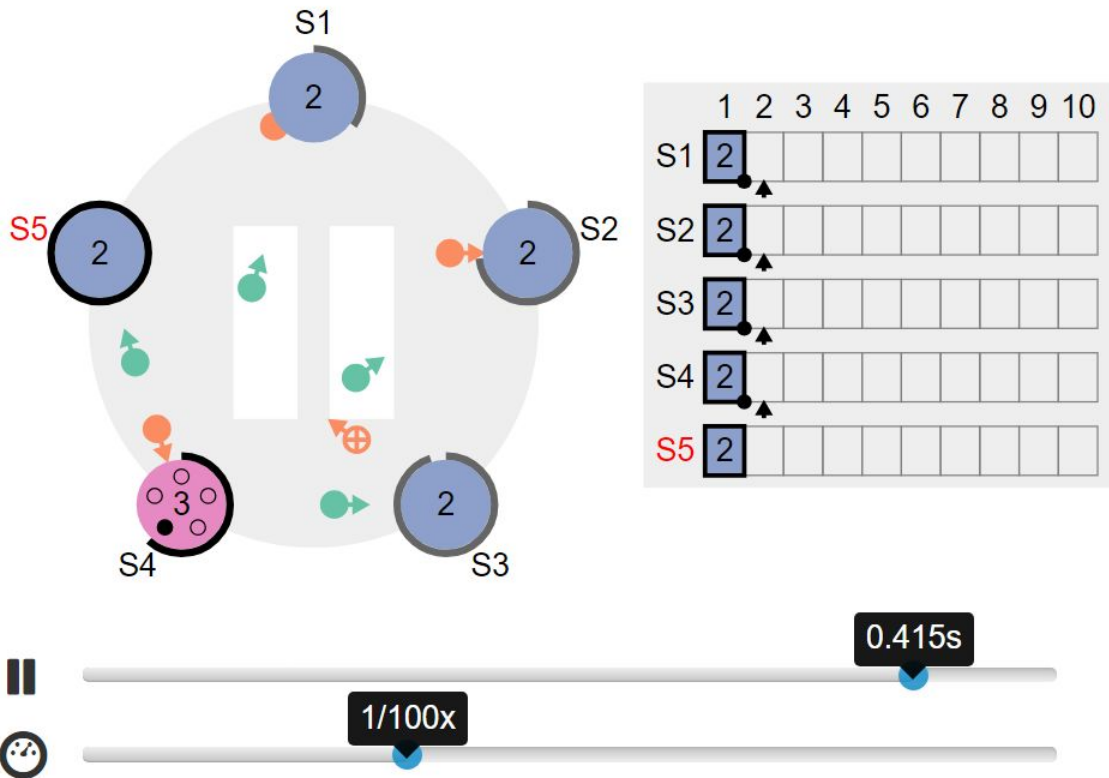
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RAFT

RAFT is a
great
consensus
example!

Leader Election

Log Replication



The Secret Lives of Data is a different visualization of Raft. It's more guided and less interactive, so it may be a gentler starting point.

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RAFT

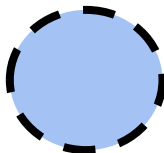
Leader Election

Nodes have 3 states:

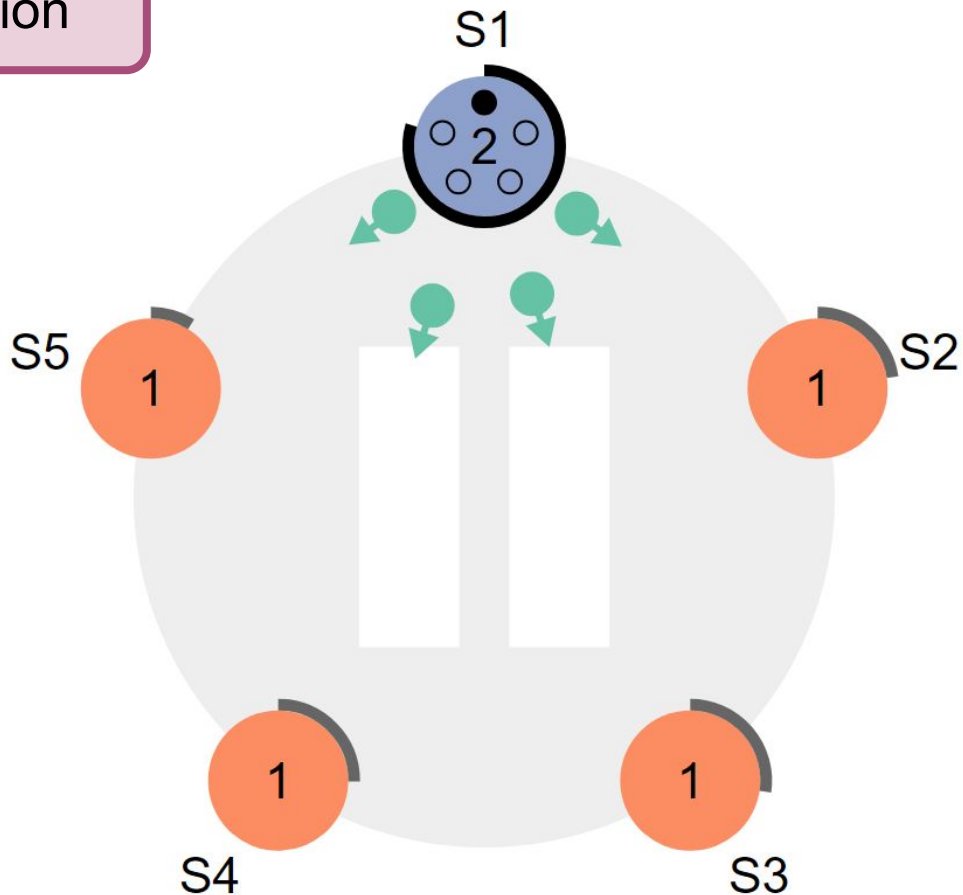
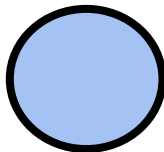
Follower



Candidate



Leader

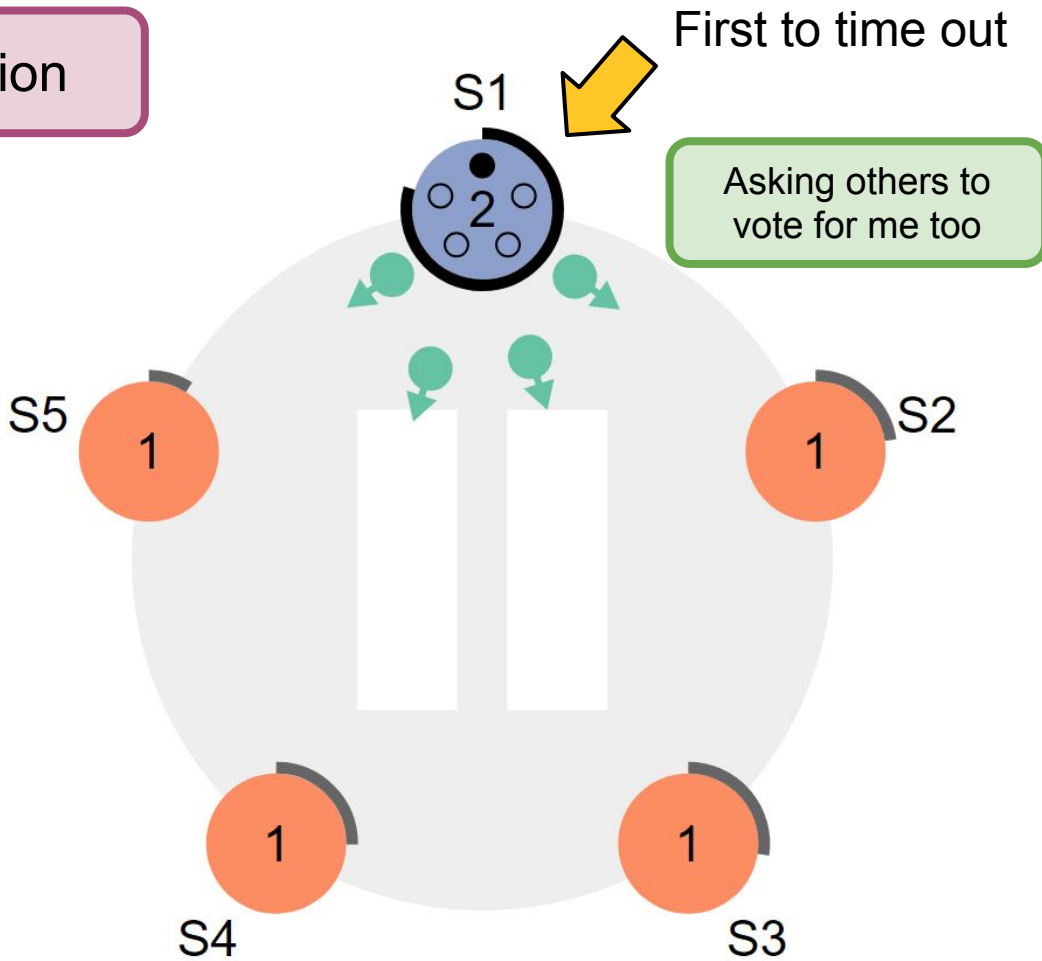


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RAFT

Leader Election

This is the first election

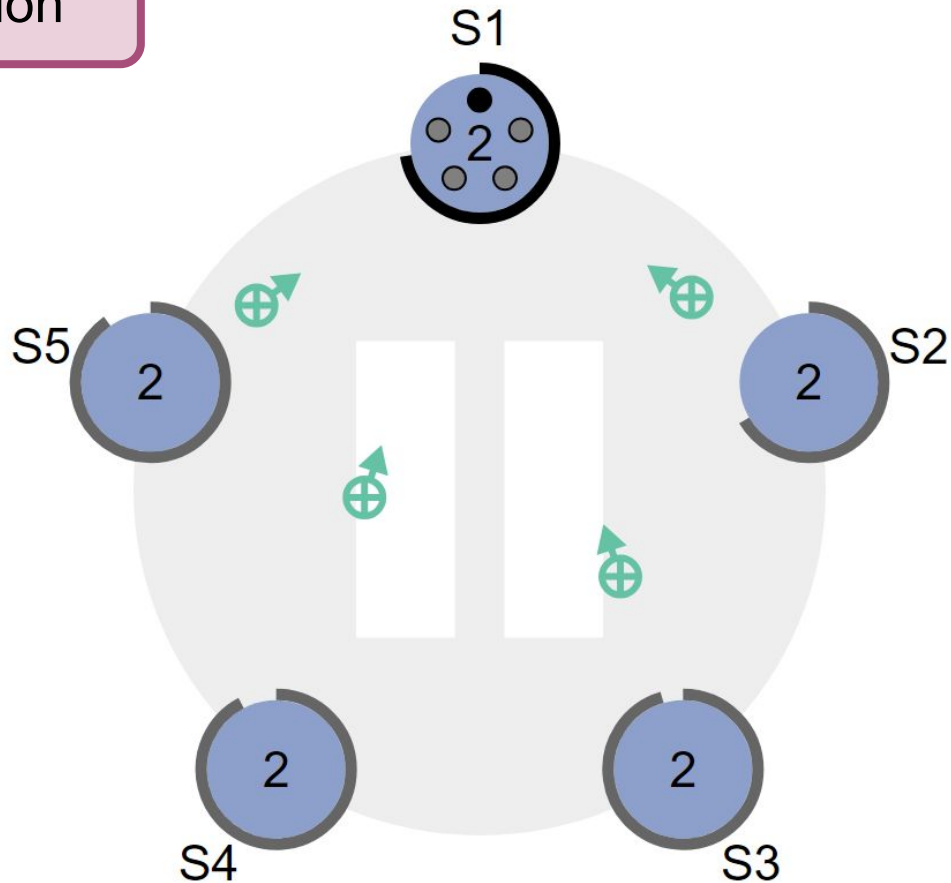


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RAFT

Leader Election

Other nodes said
sure whatever

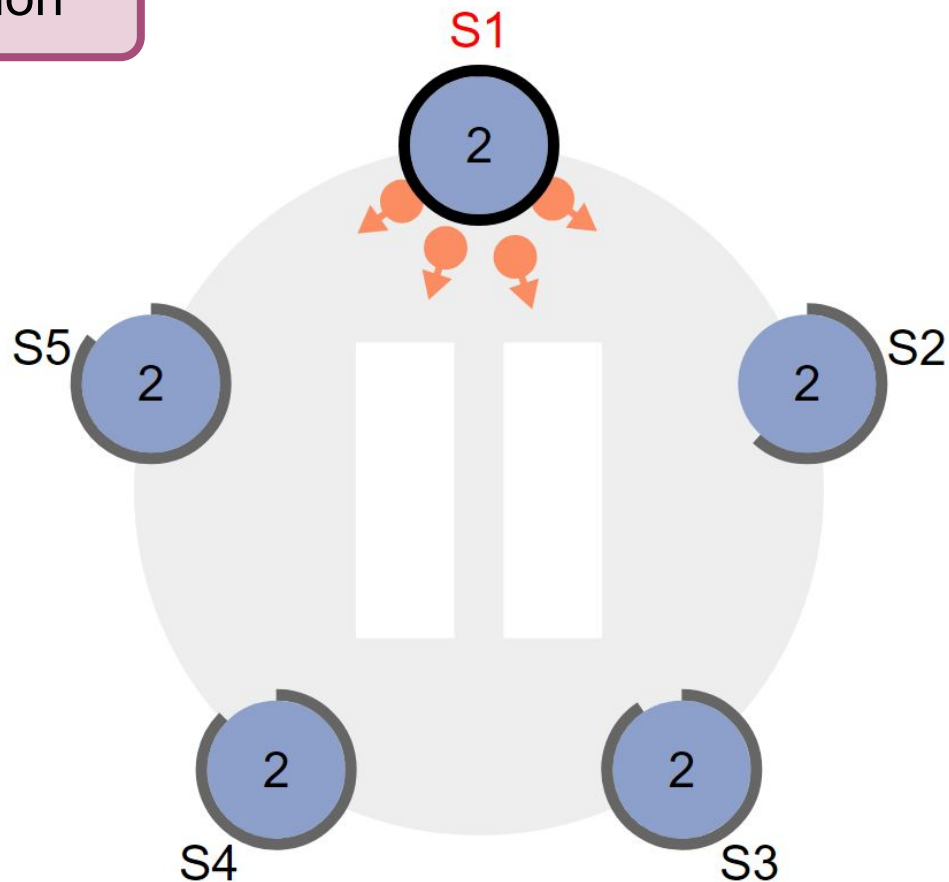


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Leader Election

Now confirmed
as Leader



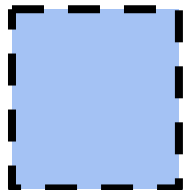
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RAFT

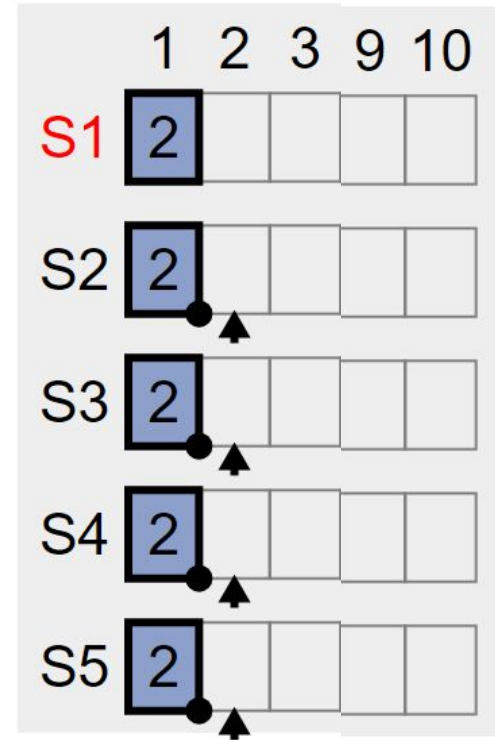
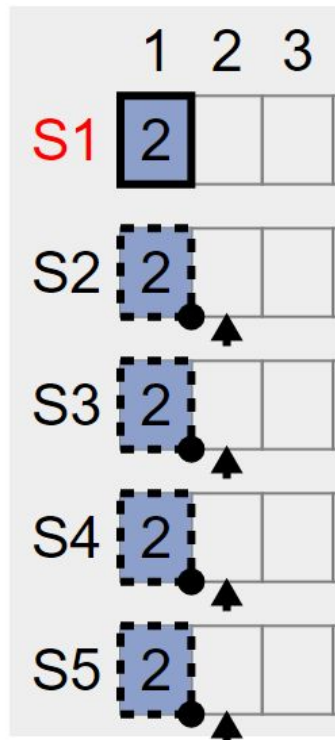
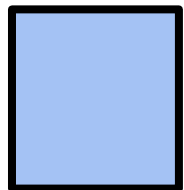
Log Replication

Same Pattern!

Candidate



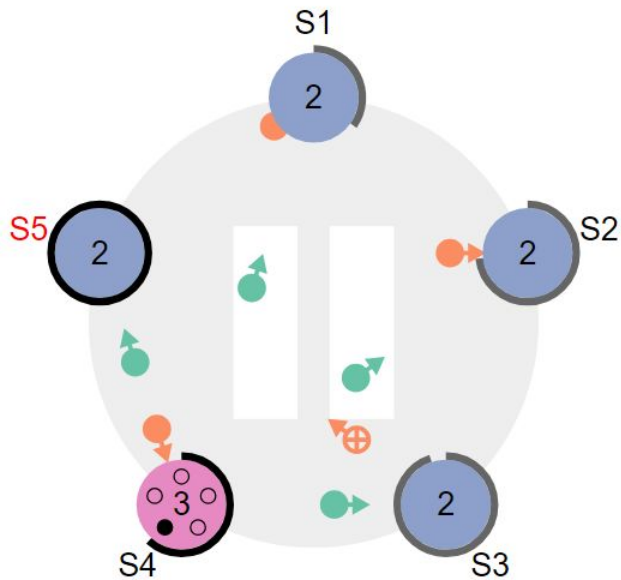
Added



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RAFT

RAFT



	1	2	3	4	5	6	7	8	9	10
S1	2									
S2	2									
S3	2									
S4	2									
S5	2									



1/100x

0.415s

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Scratch Space

Questions?

Survey:

<http://bit.ly/ASN2324>



Upcoming Events

SI Sessions:

- Sunday, April 21st at 7:00 pm MST - **REVIEW SESSION**
- Monday, April 22nd at 7:00 pm MST - **Q&A SESSION**
- ~~Thursday, April 25th at 7:00 pm MST~~ - **CANCELLED**
- Sunday, April 28th at 7:00 pm MST

Review Sessions:

- Sunday, April 21st at 7:00 pm MST
- **Thursday, April 25th Session is *cancelled***

More Questions?

Check out our other resources!

tutoring.asu.edu



Academic Support

Academic Support Network (ASN) provides a variety of free services in-person and online to help currently enrolled ASU students succeed academically.

Services



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Need help with undergraduate or graduate writing assignments? Schedule an in-person or online appointment, access your appointment link, or wait in our drop-in queue.

[Access your appointment link](#)

[Access the drop-in queue](#)

Schedule Appointment



Online Study Hub

Join our online peer communities to connect with your fellow Sun Devils. Engage with our tools to search our bank of resources, videos, and previously asked questions. Or, ask our Tutorbot questions.

Now supporting courses in Math, Science, Business, Engineering, and Writing.

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1-

Go to Zoom

2-

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1. Click on 'Go to Zoom' to log onto our Online Tutoring Center.
2. Click on 'View the tutoring schedule' to see when tutors are available for specific courses.

More Questions?

Check out our other resources!

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



What are online peer communities?

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.



How can tutoring center videos help?

Videos can help supplement the learning you're doing in and outside of class and include step-by-step methods for how to understand concepts.



How does the Tutorbot work?

You can ask the Tutorbot questions about course concepts and the Tutorbot will recommend additional resources and examples to help address your questions.

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Business


ACC 231

Uses of Accounting Info I

 [Peer Community](#)

ACC 241

Uses of Accounting Info II

 [Peer Community](#)

CIS 105

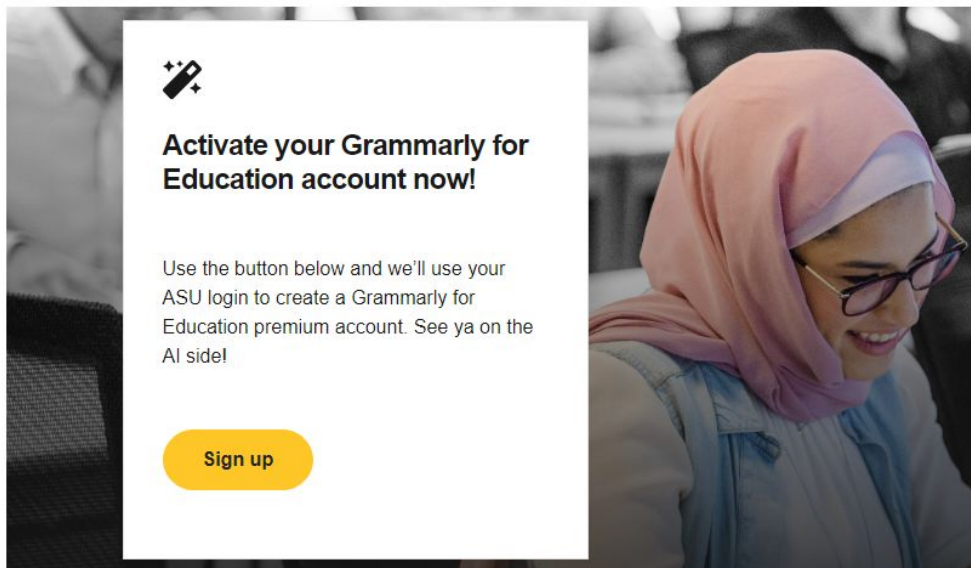
Computer Applications and Information Technology

 [Peer Community](#)

Don't forget to check out the Online Study Hub for additional resources!

Expanded Writing Support Available

Including Grammarly for Education, at no cost!



tutoring.asu.edu/expanded-writing-support

*Available slots for this pilot are limited

Additional Resources

- [Course Repo](#)
- [Gradle Documentation](#)
- [GitHub SSH Help](#)
- [Linux Man Pages](#)
- [OSI Interactive](#)
- [MDN HTTP Docs](#)
 - [Requests](#)
 - [Responses](#)
- [JSON Guide](#)
- [org.json Docs](#)
- [javax.swing package API](#)
- [Swing Tutorials](#)
- [Dining Philosophers Interactive](#)
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- [RAFT](#)