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

SimplePeerToPeer

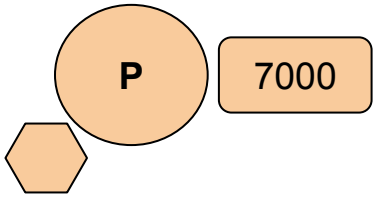
SER 321

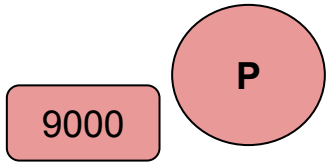
Communication

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

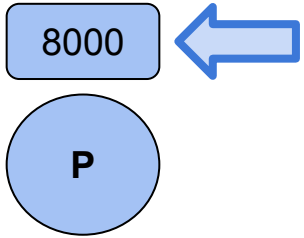
Run With:

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





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



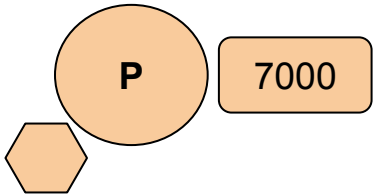

```
gradle runPeer --args "Peer8000 8000"
```

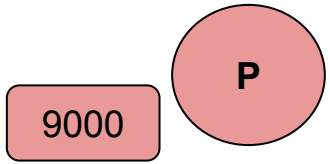
SimplePeerToPeer

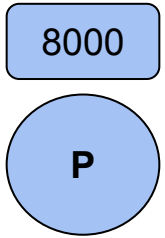
SER 321
Communication

```
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
```








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

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> 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
```

SimplePeerToPeer

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Communication

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

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> Task :runPeer
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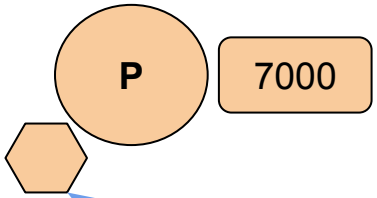

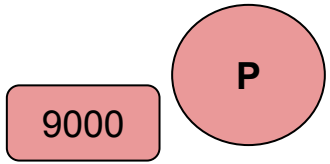

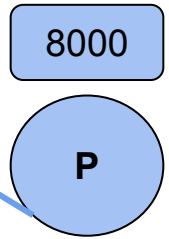


```
> Task :runPeer
Hello Peer8000 and welcome! Your port will be 8000
> Who do you want to listen to? Enter host:port
<<===<==<<==<=<==========----> 75% EXECUTING [1m 56s]
> You can now start chatting (exit to exit)
<==========----> 75% EXECUTING [2m 3s]
> :runPeer
```

SimplePeerToPeer

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Communication

What will happen?

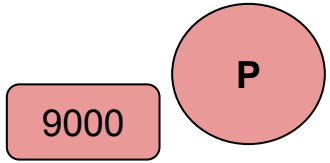
```
> Task :runPeer
Hello Peer7000 and welcome! Your port will be 7000
> Who do you want to listen to? Enter host:port
<==========----> 75% EXECUTING [21s]
> :runPeer
```

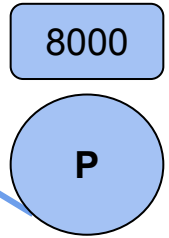
```
> Task :runPeer
Hello Peer8000 and welcome! Your port will be 8000
> Who do you want to listen to? Enter host:port
<<===<==<<==<=<==========----> 75% EXECUTING [1m 56s]
> You can now start chatting (exit to exit)
<<<==<=<==========----> 75% EXECUTING [3m 33s]
<==========----> 75% EXECUTING [3m 37s]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



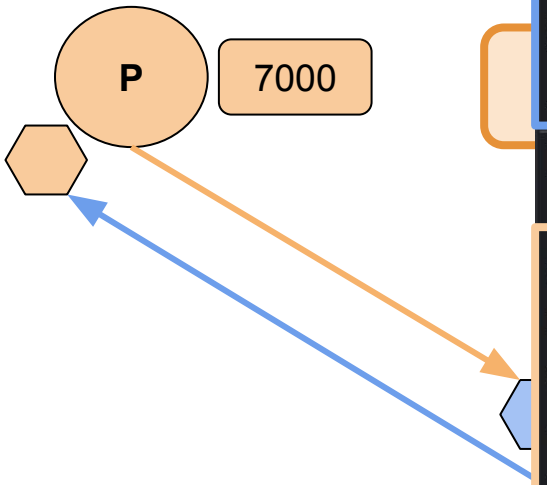



```
> Task :runPeer
Hello Peer8000 and welcome! Your port will be 8000
> Who do you want to listen to? Enter host:port
<<===<==<<==<=<==========----> 75% EXECUTING [1m 56s]
> You can now start chatting (exit to exit)
<<<==<=<==========----> 75% EXECUTING [3m 13s]
> :runPeer
hi 7000
```

SER 321
Communication

```
> Task :runPeer
Hello Peer7000 a
> Who do you wan
<=<====<==<===<=
> :runPeer
localhost:8000
```

```
> 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!
```

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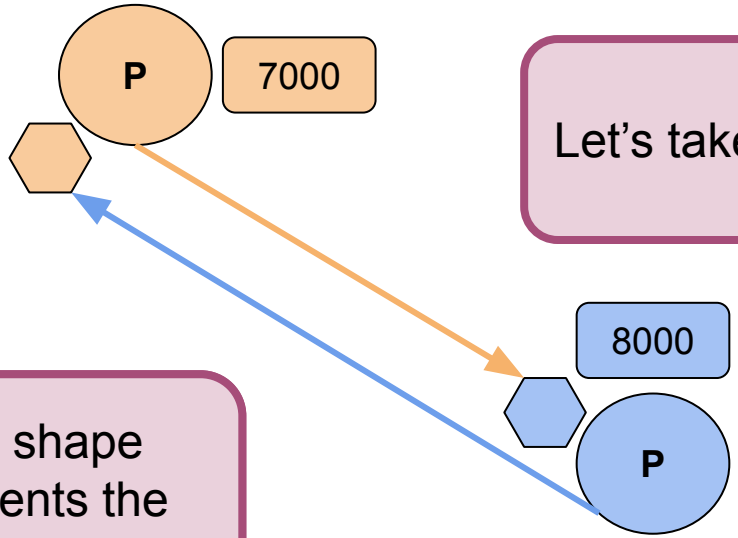
Communication

```
> Task :runPeer
Hello Peer7000 and welcome! Your port will be 7000
> Who do you want to listen to? Enter host:port
<=<====<==<===<----------> 75% EXECUTING [3m 22s]
> :runPeer
localhost:8000
```



Let's take a closer look at the Code!

What shape represents the **ClientThread?**

```
> 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
```

SimplePeerToPeer

SER 321
Communication

```java
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();
```

ServerThread

Peer

```java
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) {...}
    }
}
```

ClientThread

```java
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) {...}
        }
    }
}
```

SimplePeerToPeer

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Communication

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

    BufferedReader bufferedReader = new BufferedReader(new InputStreamReader(System.in));
    Strin
    Syste

    // st
```

```
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 void updateListenToPeers() throws Exception {
    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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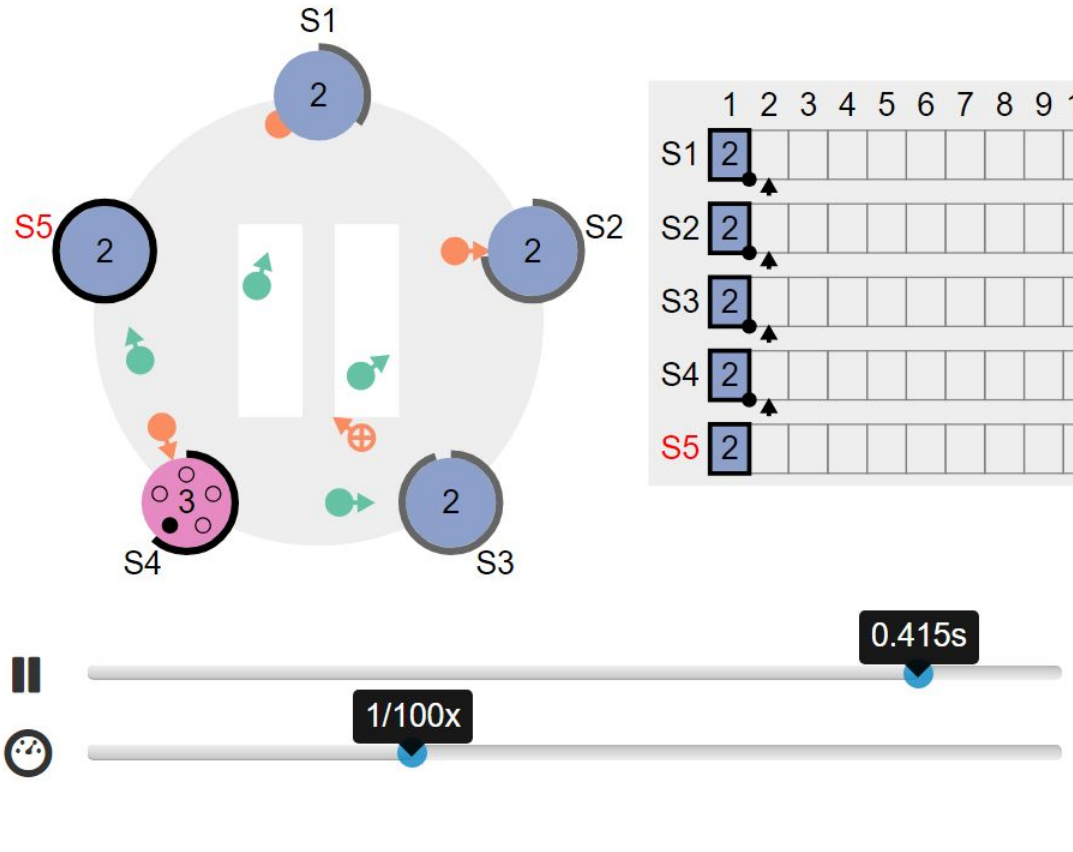
RAFT

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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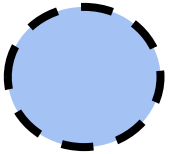
RAFT

Leader Election

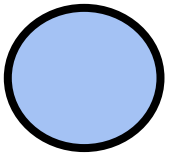
Nodes have 3 states:

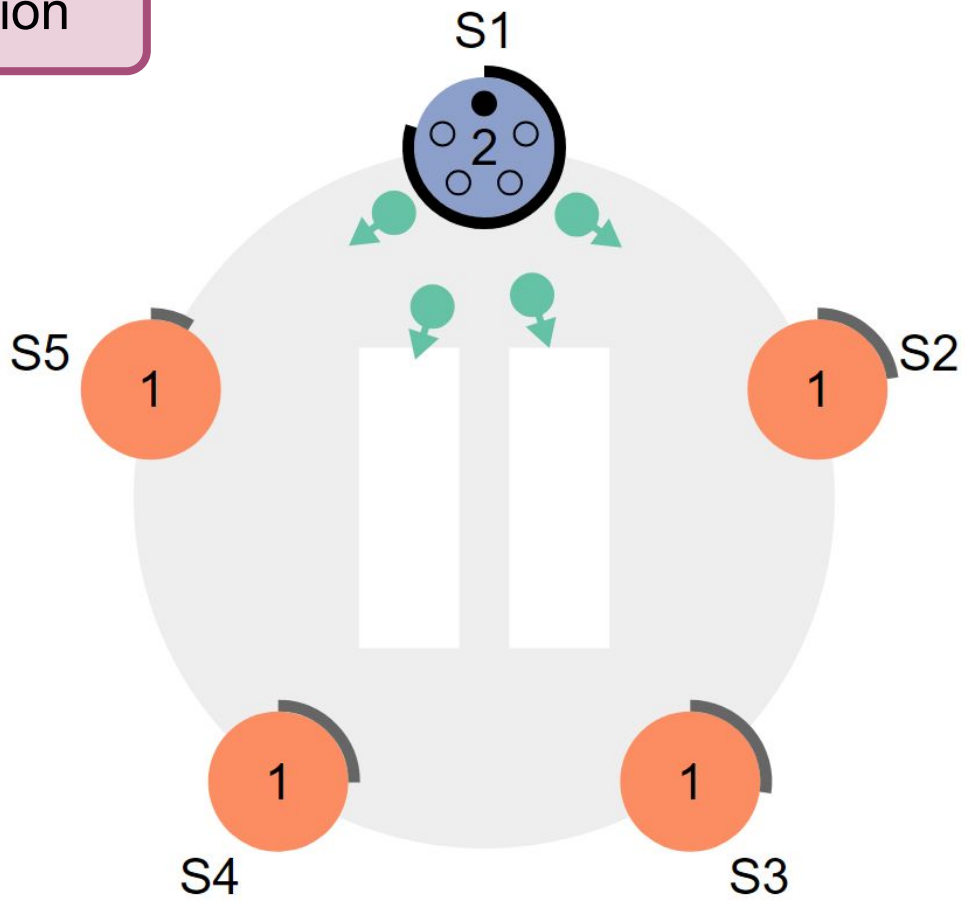
Follower

Candidate



Leader





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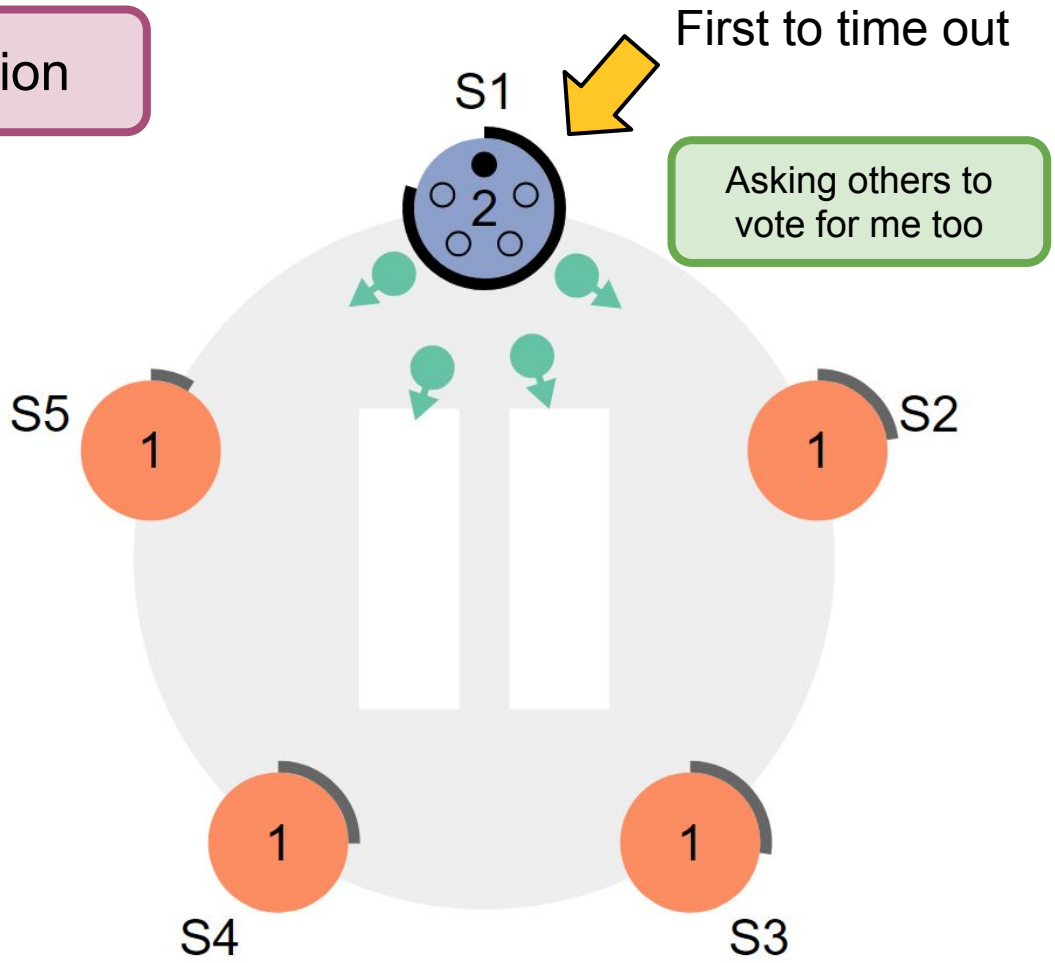
RAFT

Leader Election

This is the first election



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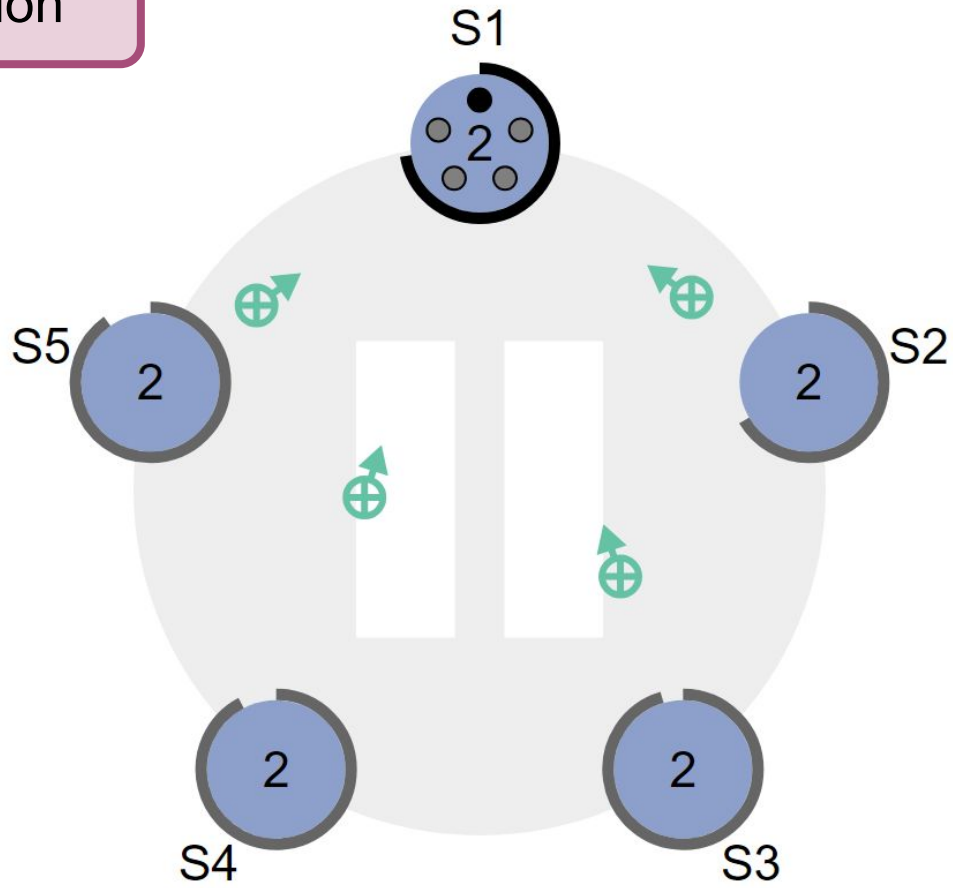
RAFT

Leader Election

Other nodes said sure whatever



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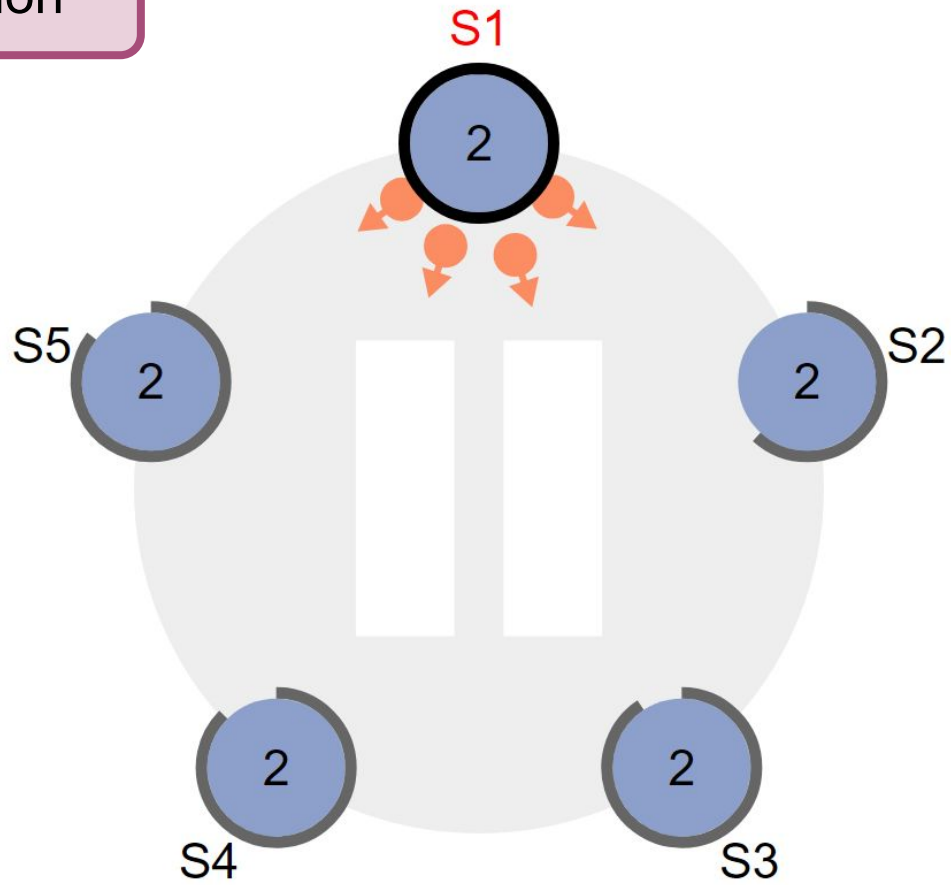
Leader Election

Now confirmed as Leader



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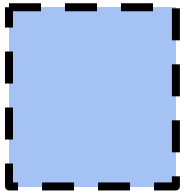
RAFT

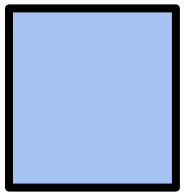
Log Replication

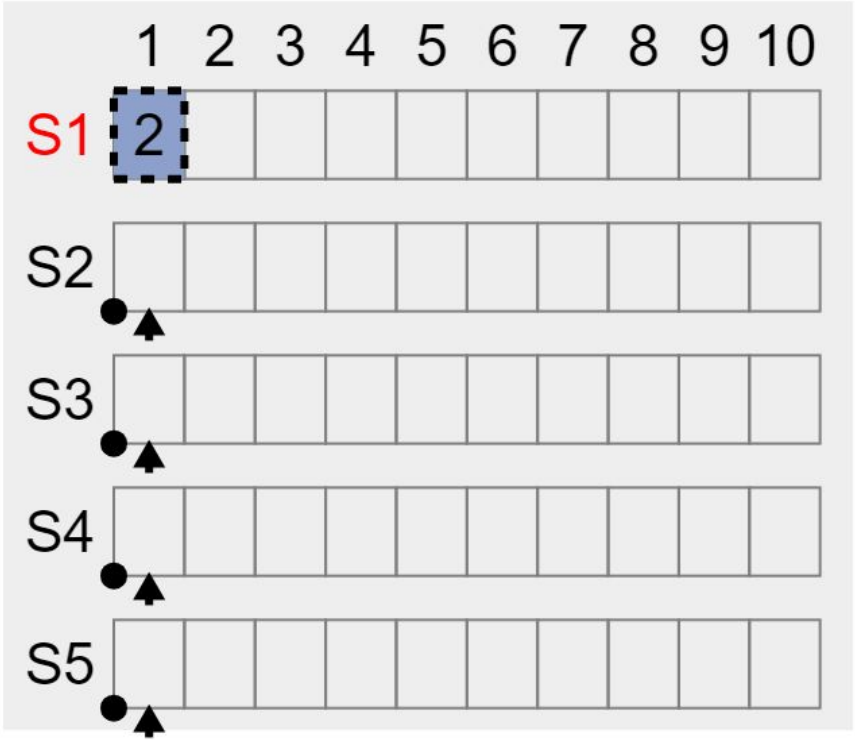
Same Pattern!

Candidate



Added





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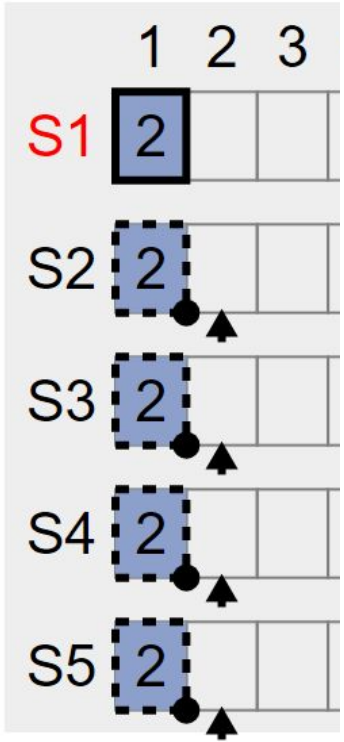
RAFT

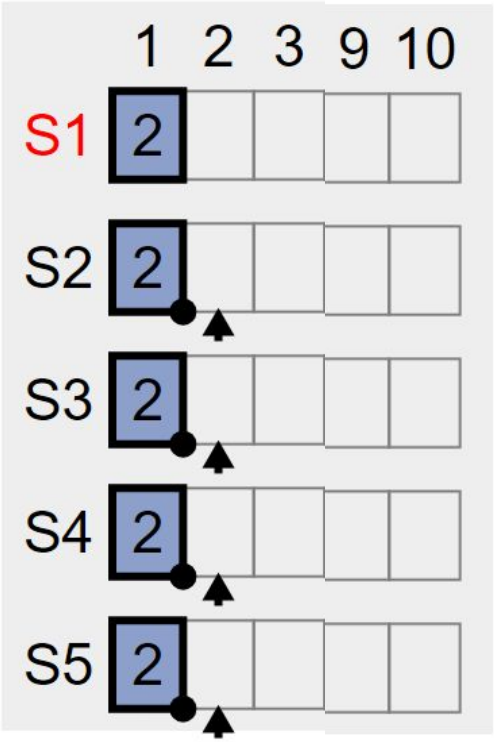
Log Replication

Same Pattern!

Candidate

Added





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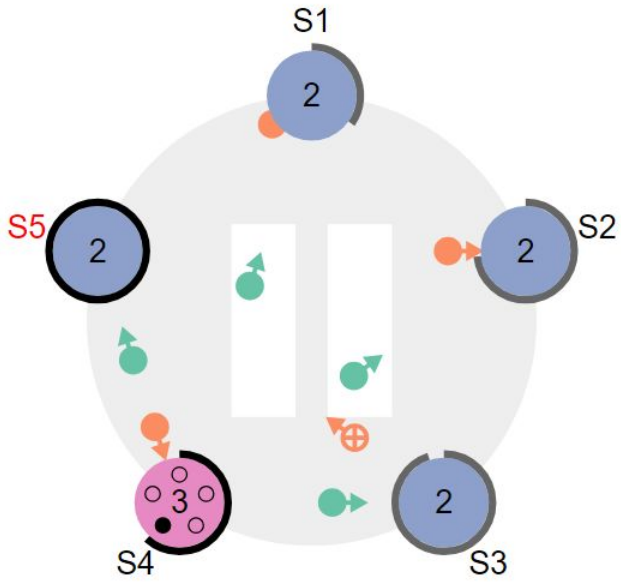
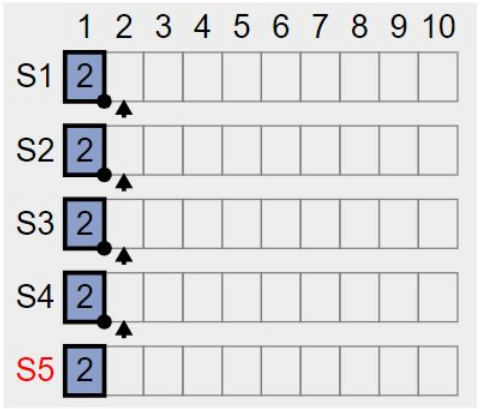
RAFT

RAFT





SER 321

Scratch Space

Questions?

Survey:

http://bit.ly/ASN2324

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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

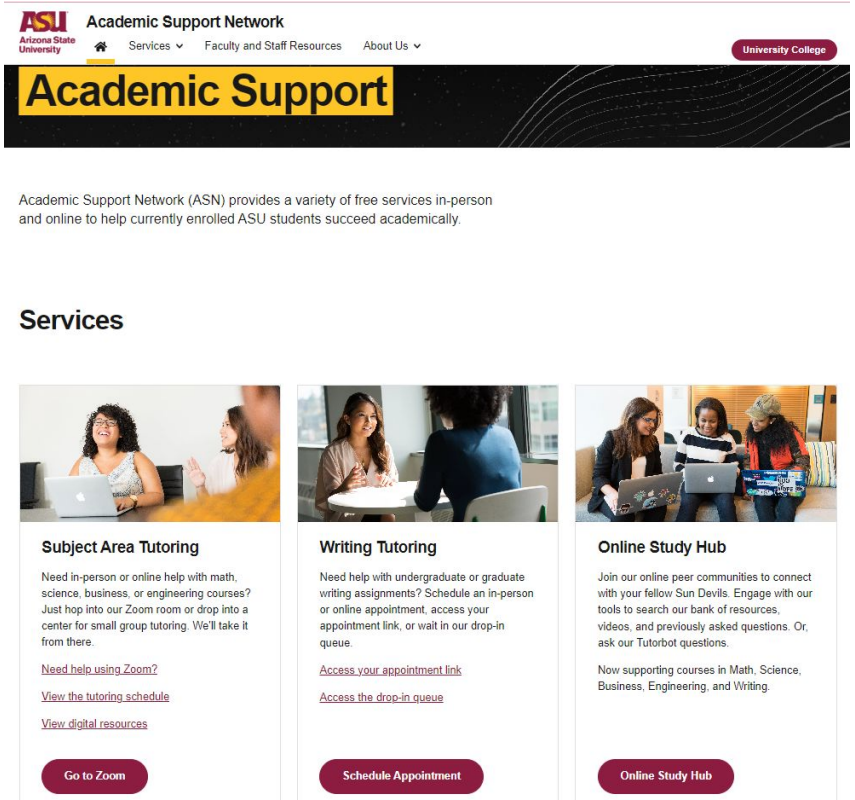
Review Sessions:

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

More Questions?

Check out our other resources!

tutoring.asu.edu

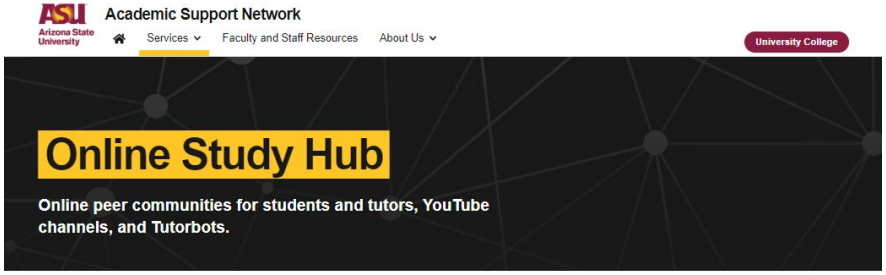


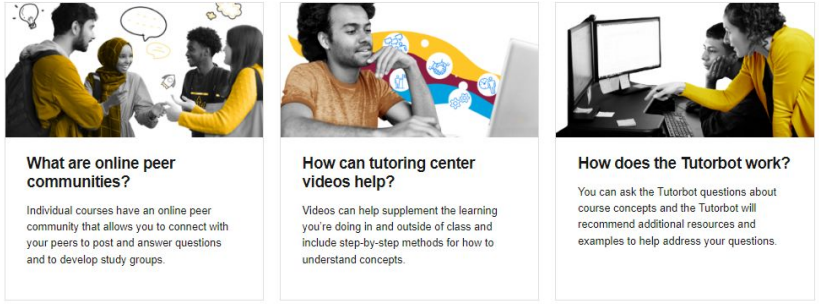
1. **Click on ‘Go to Zoom’ to log onto our Online Tutoring Center.**
2. **Click on ‘View the tutoring schedule’ to see when tutors are available for specific courses.**

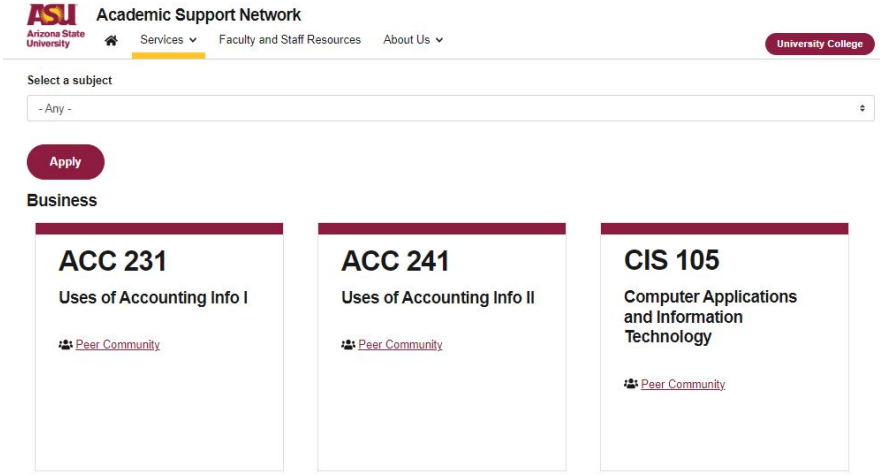
More Questions?

Check out our other resources!

tutoring.asu.edu/online-study-hub



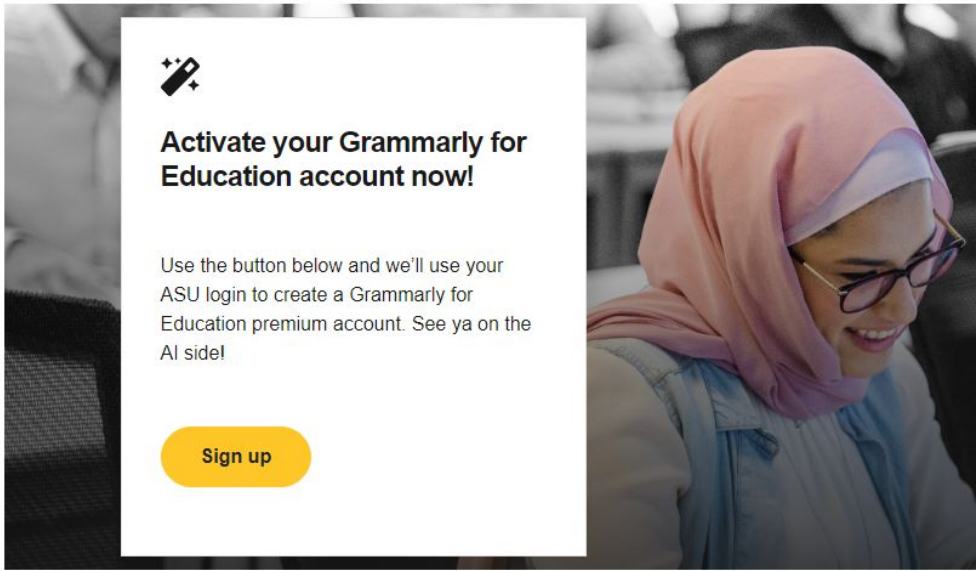




Don't forget to check out the Online Study Hub for additional resources!

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
- Austin G Walters Traffic Comparison
- RAFT