SER 321 A Session

SI Session

Tuesday, February 11th 2025

11:00 am - 12:00 pm MST

Agenda

Threading the Server

- Why?
- Where?
- How?

Threaded Server Tracing

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

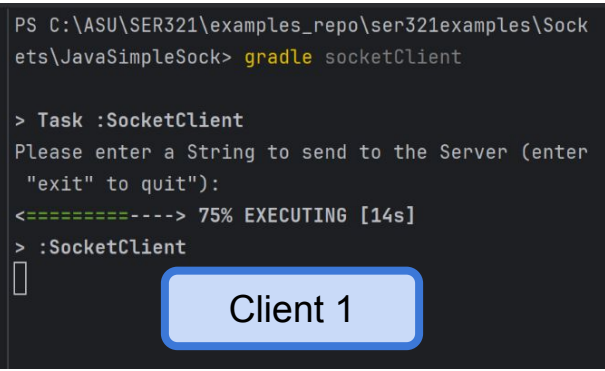
JavaSimpleSock

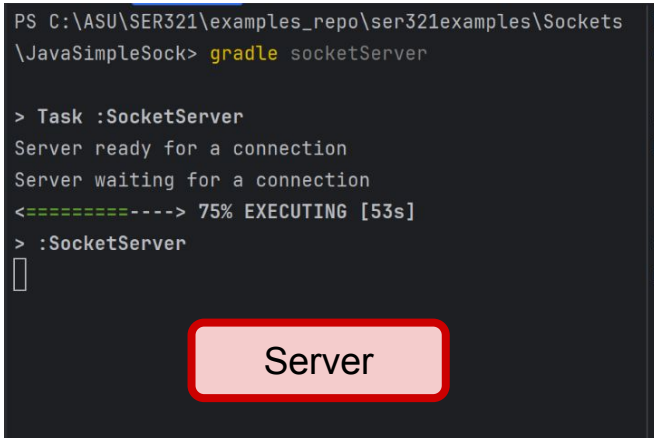
Check out the recording for the discussion!

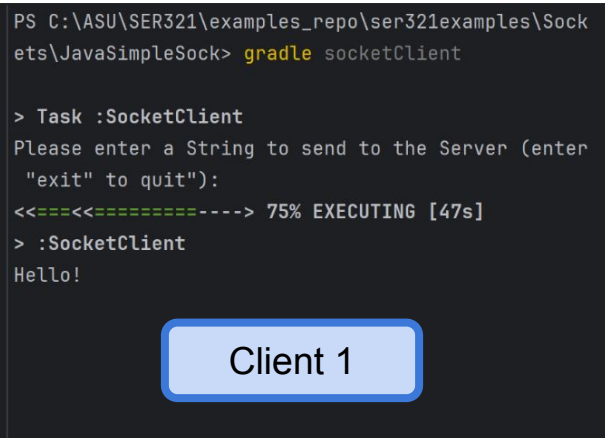
SER 321

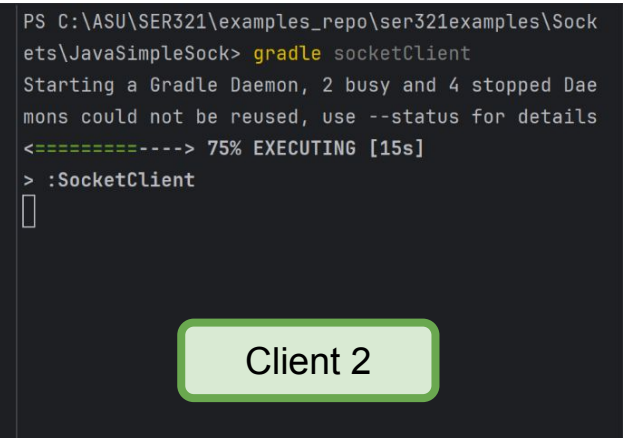
Single Threaded Server

What will happen if there are two clients?









JavaSimpleSock

Check out the recording for the discussion!

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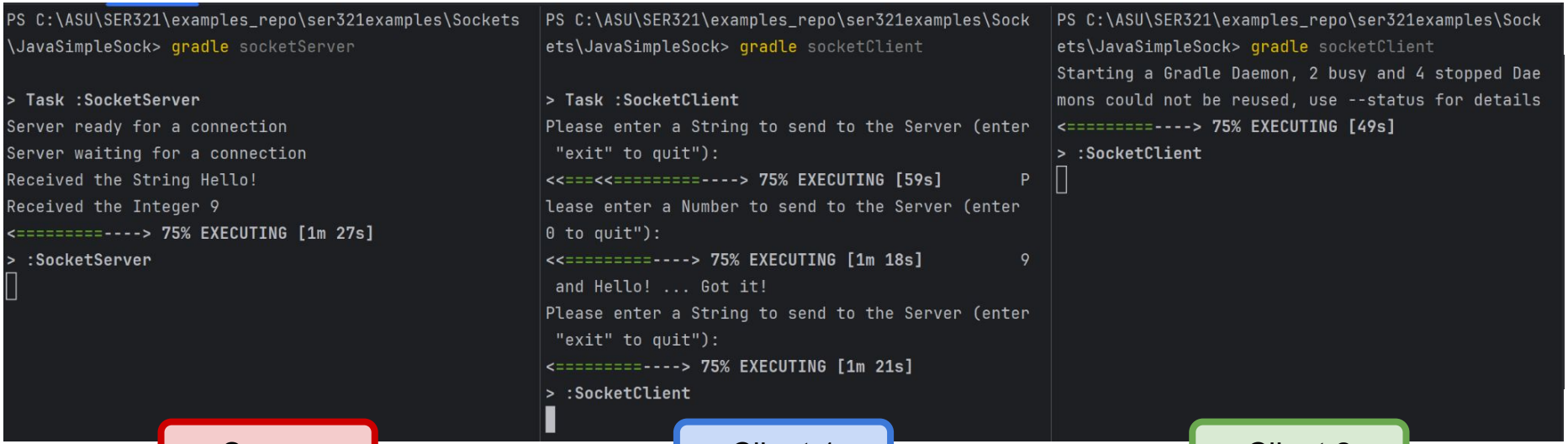
Single Threaded Server



JavaSimpleSock

Check out the recording for the discussion!

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Single Threaded Server

```
PS C:\ASU\SER321\examples_repo\ser321examples\Sockets
\JavaSimpleSock> gradle socketServer

> Task :SocketServer
Server ready for a connection
Server waiting for a connection
Received the String Hello!
Received the Integer 9
<==========----> 75% EXECUTING [1m 55s]
> :SocketServer
```

Server

```
PS C:\ASU\SER321\examples_repo\ser321examples\Sock
ets\JavaSimpleSock> gradle socketClient

> Task :SocketClient
Please enter a String to send to the Server (enter
 "exit" to quit"):
<<===<<==========----> 75% EXECUTING [59s]        P
lease enter a Number to send to the Server (enter
0 to quit"):
<<==========----> 75% EXECUTING [1m 18s]          9
 and Hello! ... Got it!
Please enter a String to send to the Server (enter
 "exit" to quit"):
<===<==========----> 75% EXECUTING [1m 49s]
> :SocketClient
exit
```

Client 1

```
PS C:\ASU\SER321\examples_repo\ser321examples\Sock
ets\JavaSimpleSock> gradle socketClient
Starting a Gradle Daemon, 2 busy and 4 stopped Dae
mons could not be reused, use --status for details
<==========----> 75% EXECUTING [1m 18s]
> :SocketClient
```

Client 2

What do we think will happen?

JavaSimpleSock

Check out the recording for the discussion!

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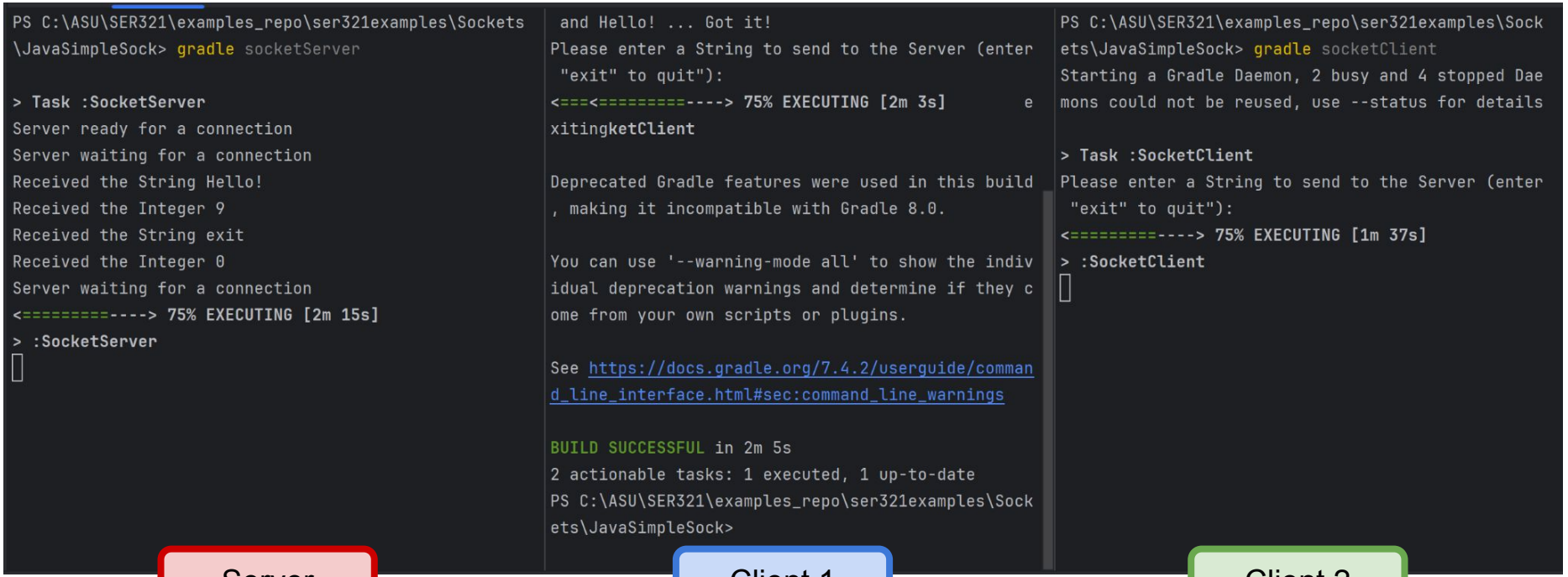
Single Threaded Server



Server

Client 1

Client 2

JavaSimpleSock

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Single Threaded Server

Check out the recording for the discussion!

```
PS C:\ASU\SER321\examples_repo\ser321examples\Sockets
\JavaSimpleSock> gradle socketServer

> Task :SocketServer
Server ready for a connection
Server waiting for a connection
Received the String Hello!
Received the Integer 9
Received the String exit
Received the Integer 0
Server waiting for a connection
Received the String Hello!
<==========----> 75% EXECUTING [3m 7s]
> :SocketServer
```

Server

```
 and Hello! ... Got it!
Please enter a String to send to the Server (enter
 "exit" to quit"):
<===<==========----> 75% EXECUTING [2m 3s]        e
xitingketClient

Deprecated Gradle features were used in this build
, making it incompatible with Gradle 8.0.

You can use '--warning-mode all' to show the indiv
idual deprecation warnings and determine if they c
ome from your own scripts or plugins.

See https://docs.gradle.org/7.4.2/userguide/comman
d_line_interface.html#sec:command_line_warnings

BUILD SUCCESSFUL in 2m 5s
2 actionable tasks: 1 executed, 1 up-to-date
PS C:\ASU\SER321\examples_repo\ser321examples\Sock
ets\JavaSimpleSock>
```

Client 1

```
PS C:\ASU\SER321\examples_repo\ser321examples\Sock
ets\JavaSimpleSock> gradle socketClient
Starting a Gradle Daemon, 2 busy and 4 stopped Dae
mons could not be reused, use --status for details

> Task :SocketClient
Please enter a String to send to the Server (enter
 "exit" to quit"):
<====<<==========----> 75% EXECUTING [2m 24s]     P
lease enter a Number to send to the Server (enter
0 to quit"):
<=<==========----> 75% EXECUTING [2m 30s]
> :SocketClient
77
```

Client 2

JavaSimpleSock

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Single Threaded Server

Why?

Check out the recording for the discussion!

```
PS C:\ASU\SER321\examples_repo\ser321examples\Sockets
\JavaSimpleSock> gradle socketServer

> Task :SocketServer
Server ready for a connection
Server waiting for a connection
Received the String Hello!
Received the Integer 9
Received the String exit
Received the Integer 0
Server waiting for a connection
Received the String Hello!
<==========----> 75% EXECUTING [3m 7s]
> :SocketServer
```

1. Define Params
2. Create Socket
3-5. Mark Socket to Listen
6. Wait for Connection
7. Handle Client Connection
8. Close Client Connection
9.

```
ets\JavaSimpleSock>
```

```
PS C:\ASU\SER321\examples_repo\ser321examples\Sock
ets\JavaSimpleSock> gradle socketClient
Starting a Gradle Daemon, 2 busy and 4 stopped Dae
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lease enter a Number to send to the Server (enter
0 to quit"):
<=<==========----> 75% EXECUTING [2m 30s]
> :SocketClient
77
```

Server

Client 1

Client 2

SER 321
Threaded Server

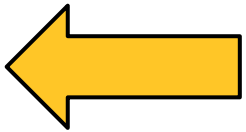
Given the standard server socket steps…

Ideas on how we could introduce threads?

1. Define Params
2. Create Socket
3-5. Mark Socket to Listen
6. Wait for Connection
7. Handle Client Connection
8. Close Client Connection
9. Continue Listening

Check out the recording for the discussion!

Why do we send the *client socket* to the thread?



7. Send Client Socket to thread

JavaThreadSock

SER 321
Threads

Check out the recording for the discussion!

1. Define Params
2. Create Socket
3-5. Mark Socket to Listen
6. Wait for Connection
7. Send Client **Socket** to Thread
8. Close Client Connection
9. Continue Listening

```
public static void main(String args[]) throws IOException {
  Socket sock = null;
  int id = 0;
  try {
    if (args.length != 1) {
      System.out.println
          ("Usage: gradle ThreadedSockServer --args=<port num>");
      System.exit( code: 0);
    }
    int portNo = Integer.parseInt(args[0]);
    if (portNo <= 1024)
      portNo = 8888;
    ServerSocket serv = new ServerSocket(portNo);

    while (true) {
      System.out.println
          ("Threaded server waiting for connects on port " + portNo);
      sock = serv.accept();
      System.out.println
          ("Threaded server connected to client-" + id);
      // create thread
      ThreadedSockServer myServerThread =
          new ThreadedSockServer(sock, id++);
      // run thread and don't care about managing it
      myServerThread.start();
    }
  } catch (Exception e) {
    e.printStackTrace();
  } finally {
    if (sock != null) sock.close();
  }
}
}
```

1

2 & 3-5

9

6

7

8

JavaThreadSock

SER 321
Threads

```
public void run() {
  try {
    // setup read/write channels for connection
    ObjectInputStream in = new ObjectInputStream(conn.getInputStream());
    ObjectOutputStream out = new ObjectOutputStream(conn.getOutputStream());

    // read the digit being send
    String s = (String) in.readObject();
    int index;
    // while client hasn't ended
    while (!s.equals("end")) {
      Boolean validInput = true;

      // checks if input only contains digits
      if (!s.matches( expr: "\\d+")) {
        validInput = false;
        out.writeObject("Not a number: https://gph.is/2yDymkn");
      }
      // if it contains only numbers
      if (validInput) {
        // convert to an integer
        index = Integer.valueOf(s);
        System.out.println("From client " + id + " get string " + index);
        if (index > -1 & index < buf.length) {
          // if valid, pull the line from the buffer array above and write it to socket
          out.writeObject(buf[index]);
        } else if (index == 5) {
          // fun surprise for mostly correct
          out.writeObject("Close but out of range: https://youtu.be/dQw4w9WgXcQ");
        } else {
          // really wrong
          out.writeObject("index out of range");
        }
      }
      //  wait for next token from the user
      s = (String) in.readObject();
    }
    // on close, clean up
    System.out.println("Client " + id + " closed connection");
    in.close();
    out.close();
    conn.close();
  } catch (Exception e) {
    e.printStackTrace();
  }
}
```

Client A

Server

```
public static void main(String args[]) throws IOException {
  Socket sock = null;
  int id = 0;
  try {
    if (args.length != 1) {
      System.out.println
          ("Usage: gradle ThreadedSockServer --args=<port num>");
      System.exit( code: 0);
    }
    int portNo = Integer.parseInt(args[0]);
    if (portNo <= 1024)
      portNo = 8888;
    ServerSocket serv = new ServerSocket(portNo);

    while (true) {
      System.out.println
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      sock = serv.accept();
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      // create thread
      ThreadedSockServer myServerThread =
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      // run thread and don't care about managing it
      myServerThread.start();
    }
  } catch (Exception e) {
    e.printStackTrace();
  } finally {
    if (sock != null) sock.close();
  }
}
```

Check out the recording for the tracing discussion!

JavaThreadSock

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Threads

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public void run() {
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    // on close, clean up
    System.out.println("Client " + id + " closing connection");
    in.close();
    out.close();
    conn.close();
  } catch (Exception e) {
    e.printStackTrace();
  }
}
```

Client A

Client B

Server

```
public static void main(String args[]) throws IOException {
  Socket sock = null;
  int id = 0;
  try {
    if (args.length != 1) {
      System.out.println
          ("Usage: gradle ThreadedSockServer --args=<port num>");
      System.exit( code: 0);
    }
    int portNo = Integer.parseInt(args[0]);
    if (portNo <= 1024)
      portNo = 8888;
    ServerSocket serv = new ServerSocket(portNo);

    while (true) {
      System.out.println
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      sock = serv.accept();
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      // create thread
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  } catch (Exception e) {
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  } finally {
    if (sock != null) sock.close();
  }
}
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JavaThreadSock

SER 321
Threads

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    // on close, clean up
    System.out.println("Client " + id + " closed connection.");
    in.close();
    out.close();
    conn.close();
  } catch (Exception e) {
    e.printStackTrace();
  }
}
```

Client A

Server

Client B

```
public static void main(String args[]) throws IOException {
  Socket sock = null;
  int id = 0;
  try {
    if (args.length != 1) {
      System.out.println
          ("Usage: gradle ThreadedSockServer --args=<port num>");
      System.exit( code: 0);
    }
    int portNo = Integer.parseInt(args[0]);
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      // run thread and don't care about managing it
      myServerThread.start();
    }
  } catch (Exception e) {
    e.printStackTrace();
  } finally {
    if (sock != null) sock.close();
  }
}
```

Check out the recording for the tracing discussion!

Check out the recording for the walkthrough!

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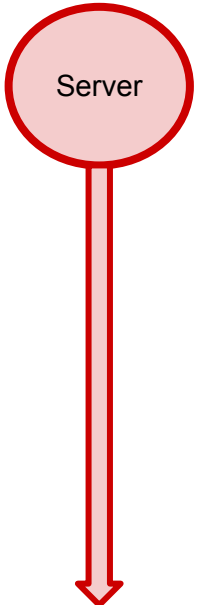
Threads



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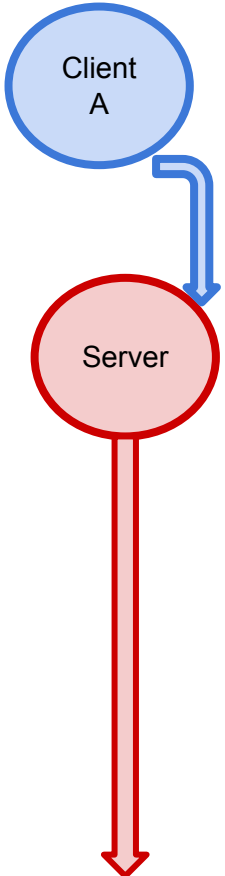
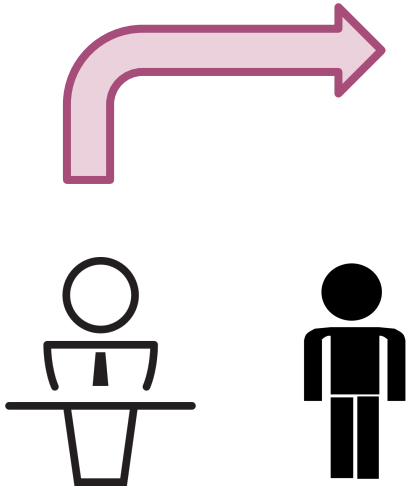
SER 321

Threads





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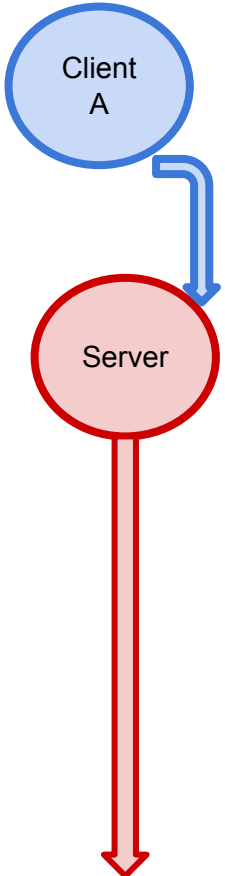
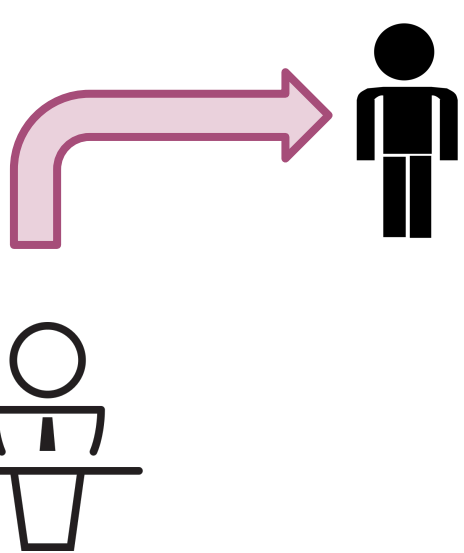
Threads





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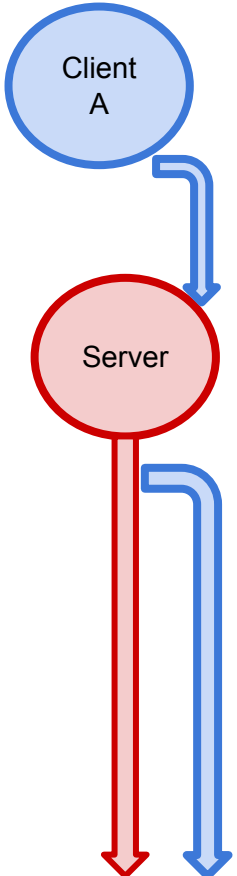
SER 321

Threads



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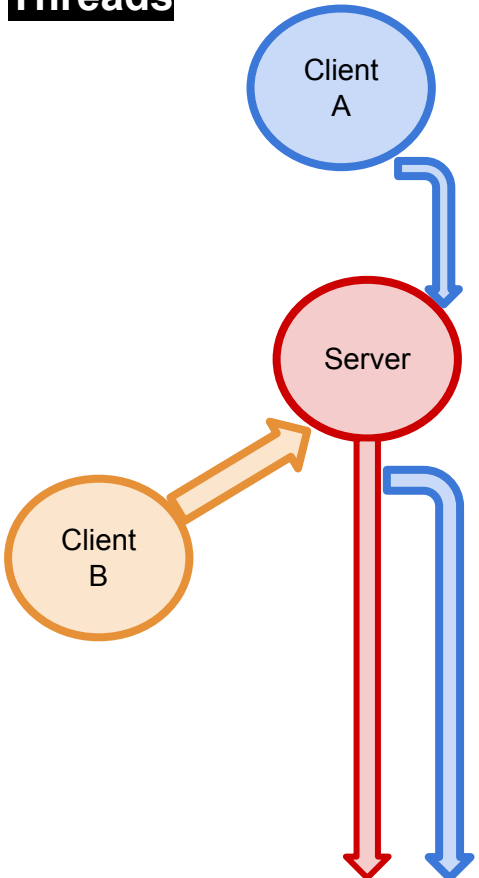
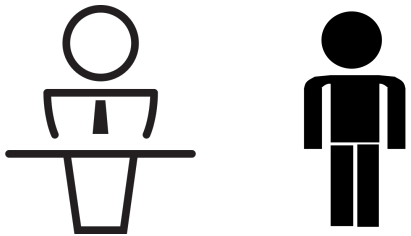
SER 321

Threads





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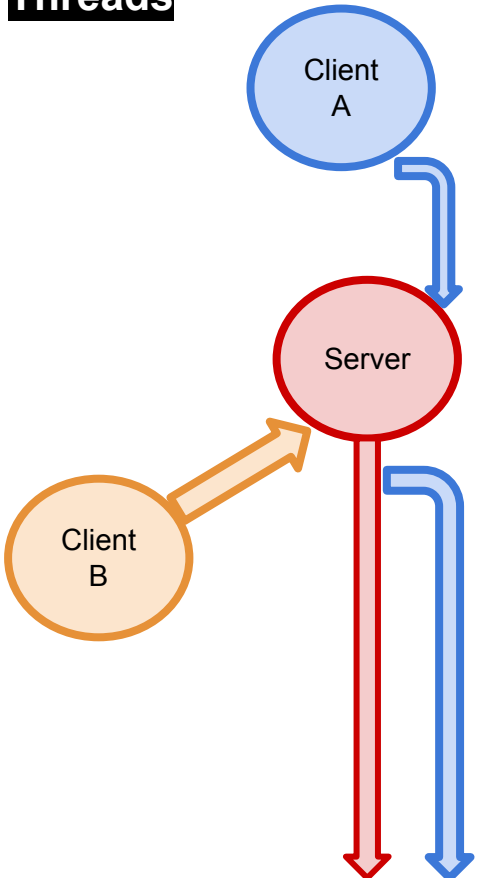
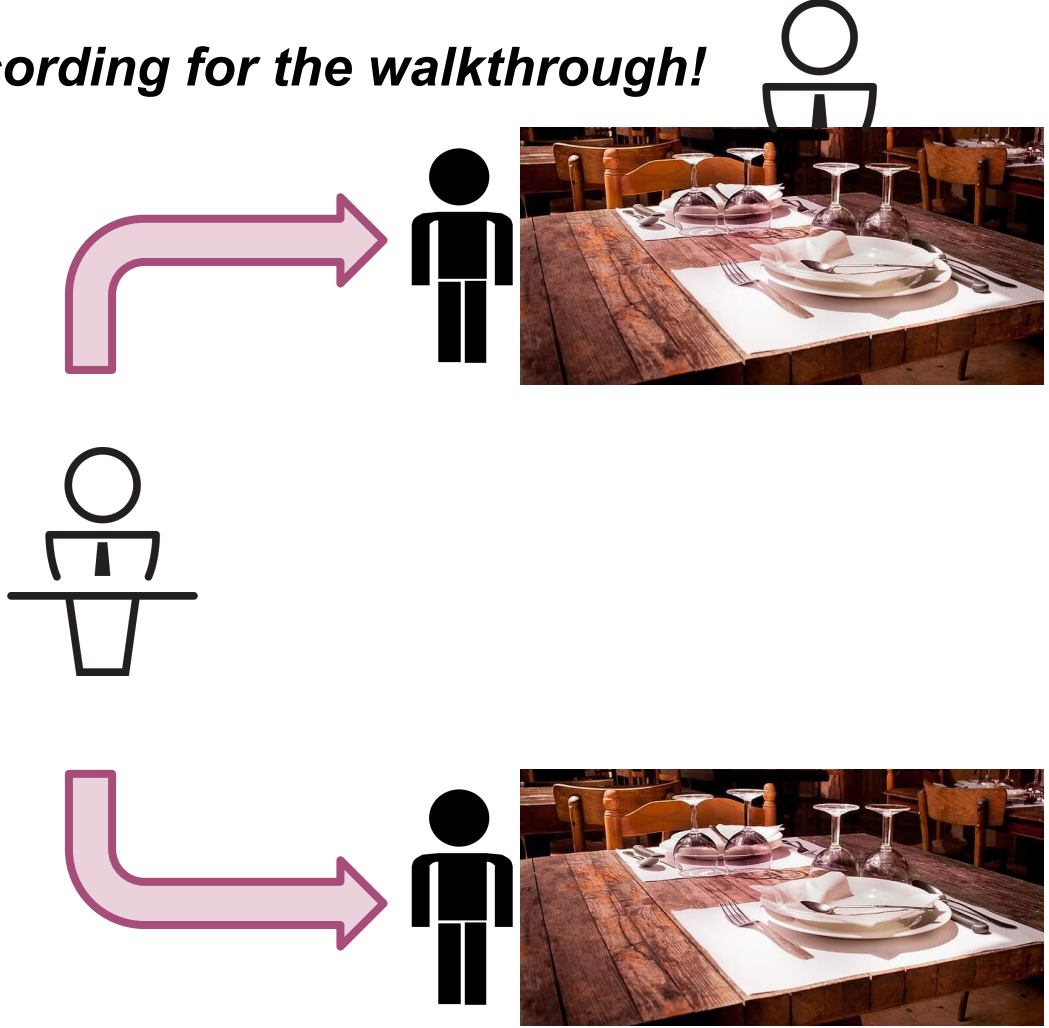
SER 321

Threads





Check out the recording for the walkthrough!

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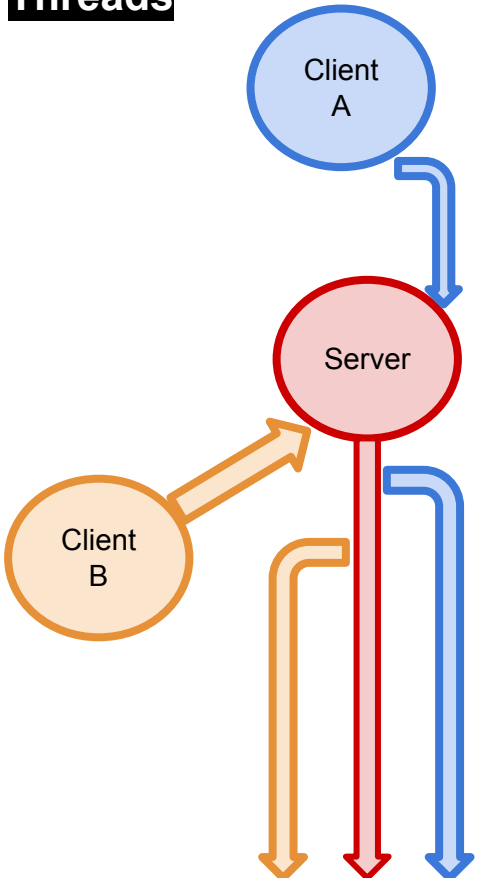
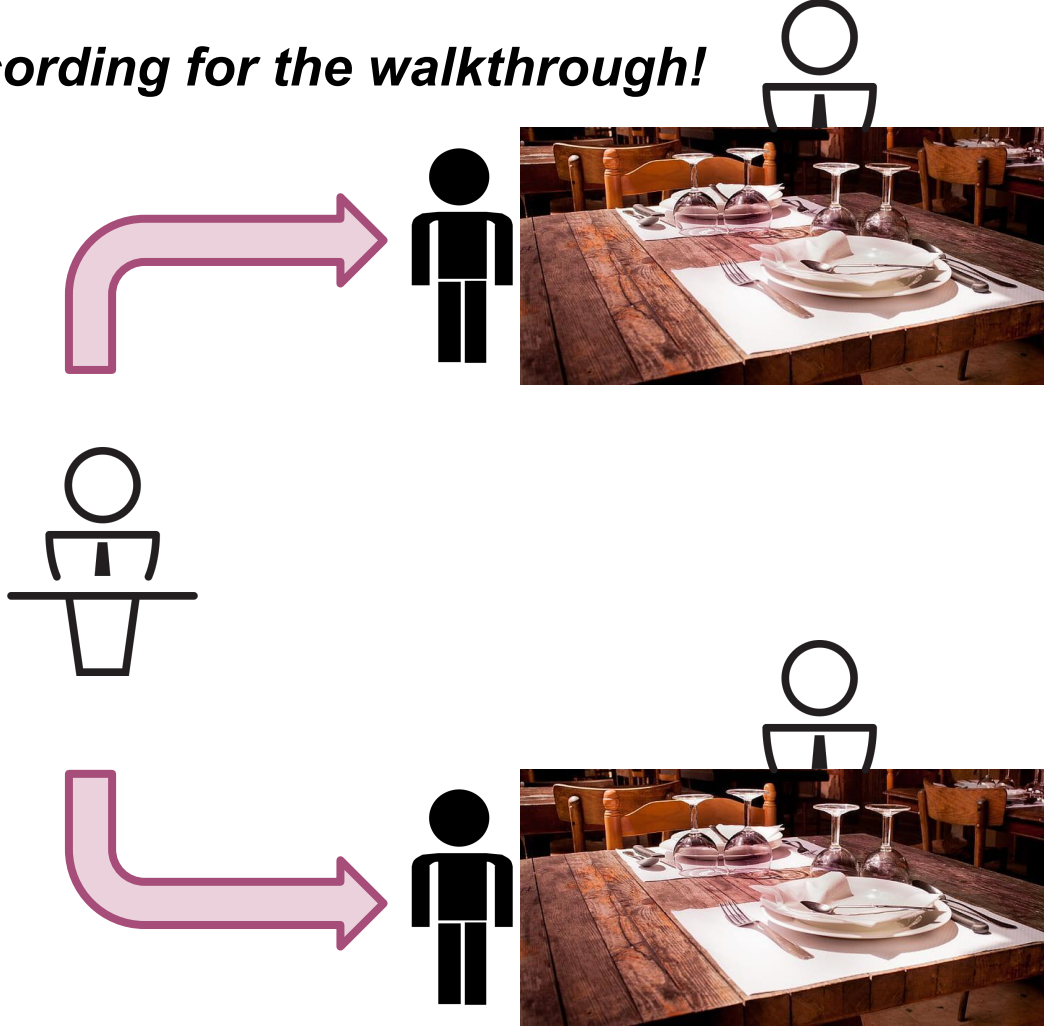
Threads





SER 321

Scratch Space

Upcoming Events

SI Sessions:

- Thursday, February 13th at 7:00 pm MST
- Sunday, February 16th at 7:00 pm MST
- Tuesday, February 18th at 11:00 am MST

Review Sessions:

- Tuesday, February 25th at 11:00 am MST - **Q&A Session**
- Thursday, February 27th at 7:00 pm MST - **Exam Review Session (2hrs)**

Questions?

Survey:

https://asuasn.info/ASNSurvey

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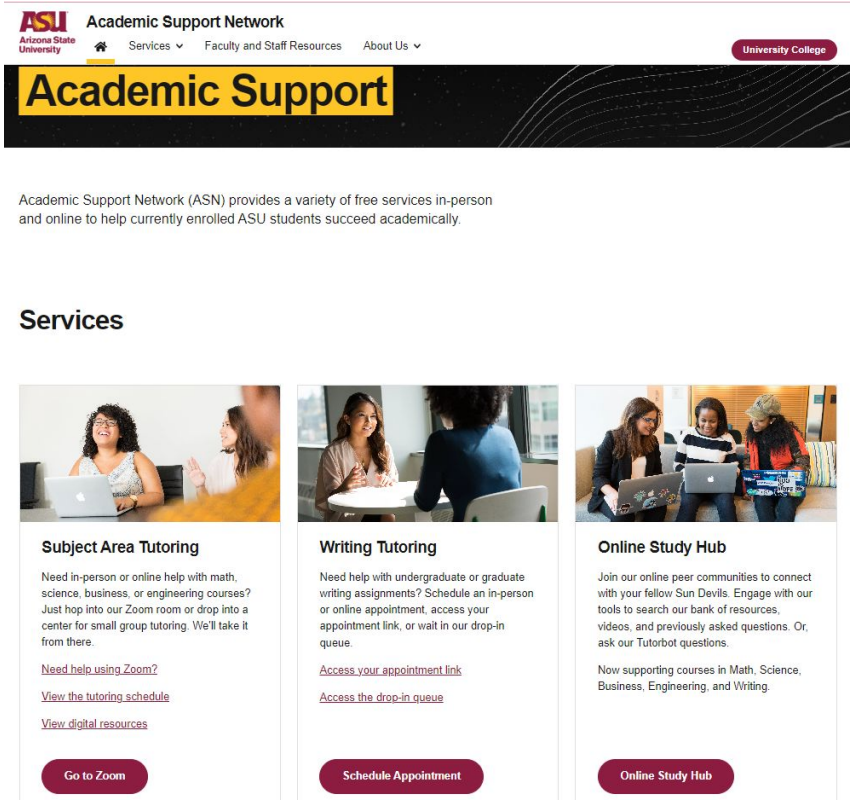
More Questions?

Check out our other resources!

tutoring.asu.edu



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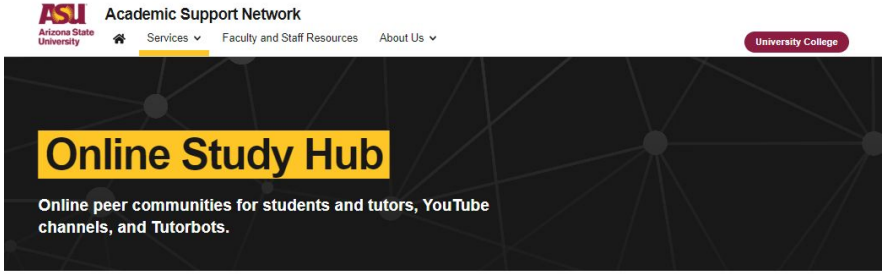
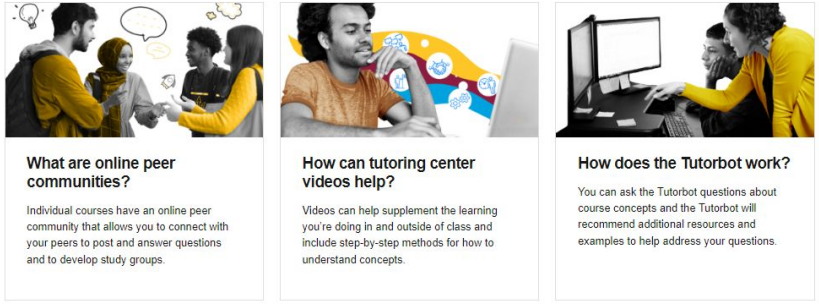
2. **Click on ‘View the tutoring schedule’ to see when tutors are available for specific courses.**

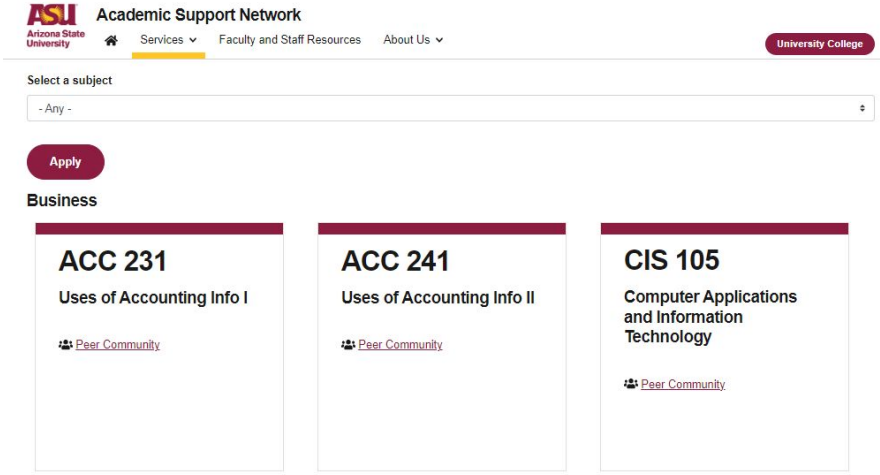
More Questions?

Check out our other resources!

tutoring.asu.edu/online-study-hub



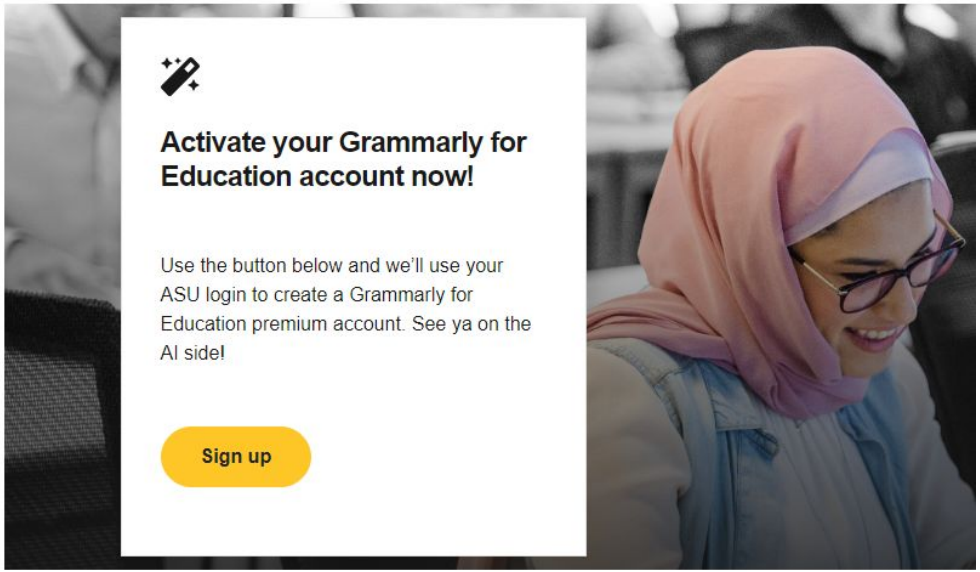




Don't forget to check out the Online Study Hub for additional resources!

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