SER 321 C Session

SI Session

Sunday, June 9th 2024

6:00 pm - 7:00 pm MST

Agenda

- Server Socket Connection
- Handling the Client Connection
- OSI Model Review
- Transport Layer Review

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:

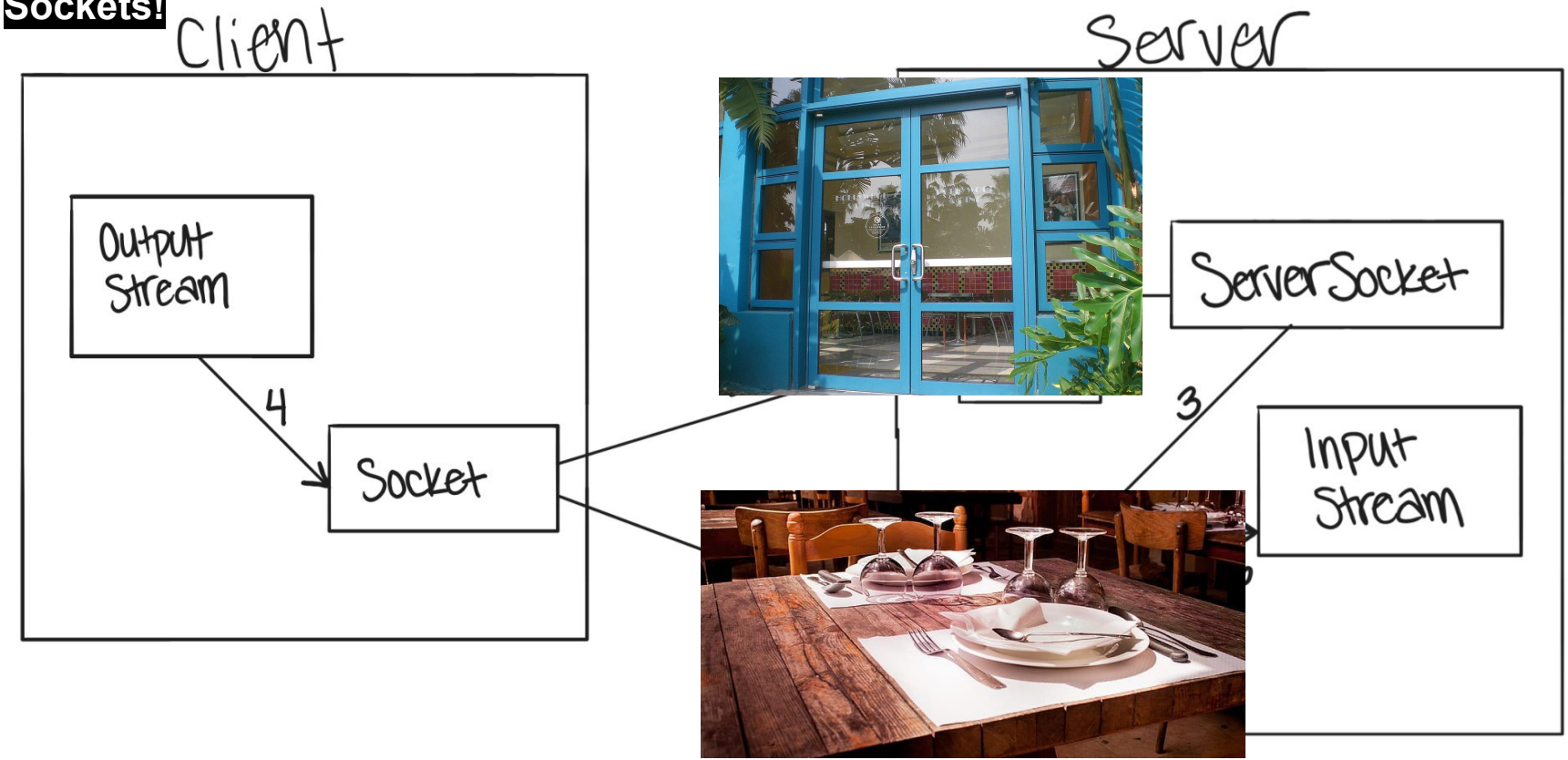
Zoom Features

Zoom Chat

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

SER 321

Sockets!



SER 321

Sockets!

```
> Task :runServer
Server ready for connections
Server is listening on port: 9099
-----
Values of the ServerSocket Object:
Inet Address: 0.0.0.0/0.0.0.0
Local Port: 9099
Server waiting for a connection
Server connected to client
-----
Values of the Client Socket Object after Connection:
        Inet Address: /127.0.0.1
        Local Address: /127.0.0.1
        Local Port: 9099
        Allocated Client Socket (Port): 60296
<==========----> 75% EXECUTING [1m 13s]
> :runServer
```

Client

```
String host = args[0];
Socket server = new Socket(host, port);
System.out.println("Connected to server at " + host + ":" + port);
System.out.println("Values of the Socket Object for the Server:");
System.out.println("\tHost: " + server.getLocalAddress());
System.out.println("\tPort: " + server.getPort());
System.out.println("\tLocal Port: " + server.getLocalPort());
```

```
> Task :runClient
Connected to server at localhost:9099
Values of the Socket Object for the Server:
        Host: /127.0.0.1
        Port: 9099
        Local Port: 60296
String to send>
<==========----> 75% EXECUTING [31s]
> :runClient
```

```
System.out.println("-----");
System.out.println("Values of the Client Socket Object after Connection:");
System.out.println("\tInet Address: " + clientSock.getInetAddress());
System.out.println("\tLocal Address: " + clientSock.getLocalAddress());
System.out.println("\tLocal Port: " + clientSock.getLocalPort());
System.out.println("\tAllocated Client Socket (Port): " + clientSock.getPort());

int numr = input.read(clientInput, off: 0, bufLen);
```

SER 321
Sockets!

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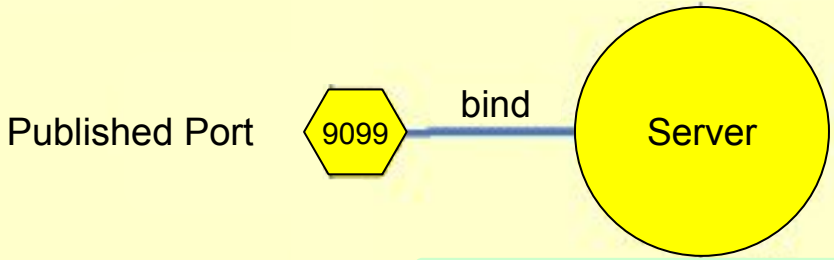
> :runServer
```

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String to send>
<=========----> 75% EXECUTING [2m 18s]s]
> :runClient
```
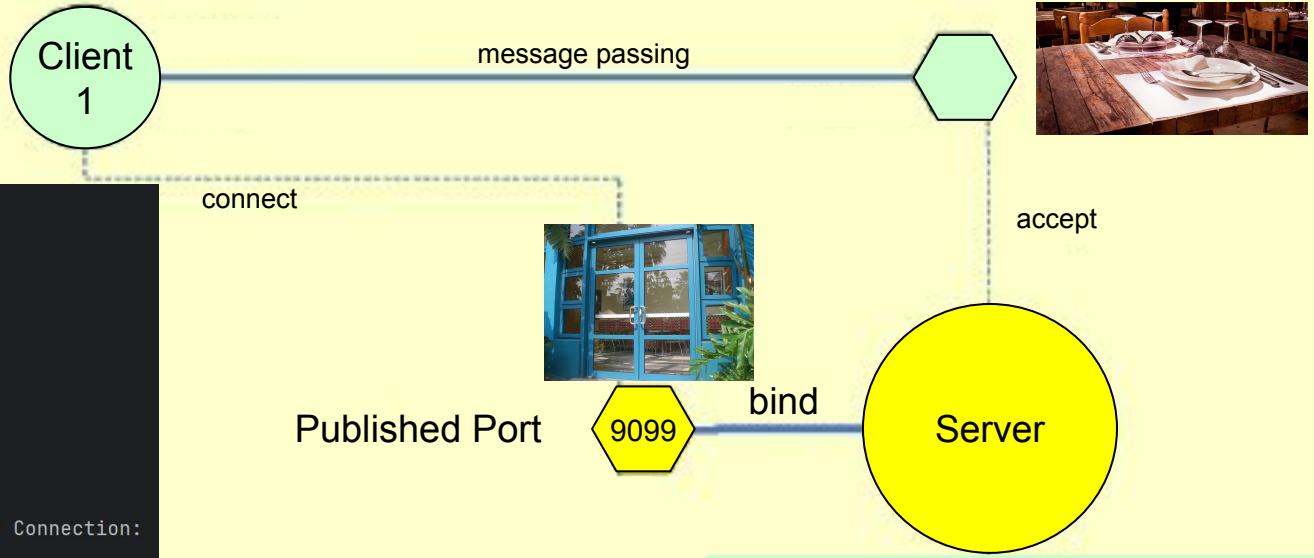

Design of an RFID Vehicle Authentication System: A Case Study for Al-Nahrain University Campus - Scientific Figure on ResearchGate. Available from: https://www.researchgate.net/figure/Client-and-Server-Socket-Ports_fig4_282671198

SER 321
Sockets!

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SER 321
Server Socket

Java handles a few steps for us…

1. Define Params
2. Create Socket
3. **C ONLY** Create a struct for the address

3-5. Mark Socket to Listen

5. Mark Socket to Listen for Connections
6. Wait for Connection
7. Handle Client Connection
8. Close Client Connection
9. Continue Listening for Connections

Assign 3-1 Starter Code

SER 321
Server Socket

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

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

  if (args.length != 1) {
    System.out.println("Expected arguments: <port(int)>");
    System.exit( status: 1);
  }

  try {
    port = Integer.parseInt(args[0]);
  } catch (NumberFormatException nfe) {
    System.out.println("[Port|sleepDelay] must be an integer");
    System.exit( status: 2);
  }

  try {
    //open socket
    ServerSocket serv = new ServerSocket(port);
    System.out.println("Server ready for connections");


    while (true){
      System.out.println("Server waiting for a connection");
      sock = serv.accept(); // blocking wait
      System.out.println("Client connected");
      // ...
```

1

2 & 3-5

9

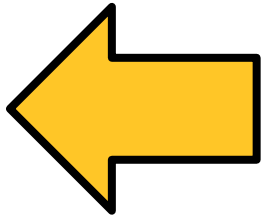
6

Assign 3-1 Starter Code

SER 321
Server Socket

What needs to be done here?

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



1

2

3

4

5

Assign 3-1 Starter Code Echo_Java

SER 321
Server Socket

What needs to be done here?

Is input
from the client
or
to the client ?

1. Define Params

```
// setup the object reading channel
in = new ObjectInputStream(sock.getInputStream());

// get output channel
OutputStream out = sock.getOutputStream();

// create an object output writer (Java only)
os = new DataOutputStream(out);
```

```
clientSock = sock.accept(); // blocking wait
PrintWriter out = new PrintWriter(clientSock.getOutputStream(), autoFlush: true);
InputStream input = clientSock.getInputStream();
System.out.println("Server connected to client");
```

1

2

3

4

5

Assign 3-1 Starter Code

SER 321

Server Socket

What needs to be done here?

```
static void overandout() {
  try {
    os.close();
    in.close();
    sock.close();
  } catch(Exception e) {e.printStackTrace();}

}
```

```
  try {
    s = (String) in.readObject();
  } catch (Exception e) {
    System.out.println("Client disconnect");
    connected = false;
    continue;
  }
```

1 Create input/output streams

2

3

4

5

Assign 3-1 Starter Code

SER 321
Server Socket

What needs to be done here?

```
JSONObject res = isValid(s);

if (res.has( key: "ok")) {
  writeOut(res);
  continue;
}

JSONObject req = new JSONObject(s);

res = testField(req,  key: "type");
if (!res.getBoolean( key: "ok")) {
  res = noType(req);
  writeOut(res);
  continue;
}
```

```
public static JSONObject isValid(String json) {
  try {
```

```
static JSONObject testField(JSONObject req, String key){
  JSONObject res = new JSONObject();

  // field does not exist
  if (!req.has(key)){
    res.put("ok", false);
    res.put("message", "Field " + key + " does not exist in request");
    return res;
  }
  return res.put("ok", true);
}
```

```
      return res;
    }
  }
  return new JSONObject();
}
```

Assign 3-1 Starter Code Echo_Java

SER 321
Server Socket

What needs to be done here?

```
int numr = input.read(clientInput, off: 0, bufLen);
```

```
String received = new String(clientInput, offset: 0, numr);
System.out.println("read from client: " + received);
out.println(received);
```

```
if (req.getString( key: "type").equals("echo")) {
  res = echo(req);
} else if (req.getString( key: "type").equals("add")) {
  res = add(req);
} else if (req.getString( key: "type").equals("addmany")) {
  res = addmany(req);
} else {
  res = wrongType(req);
}
writeOut(res);
```

1 Create input/output streams

2 Check for disconnect

3 Check Protocol

4

5

Assign 3-1 Starter Code

SER 321
Server Socket

What needs to be done here?

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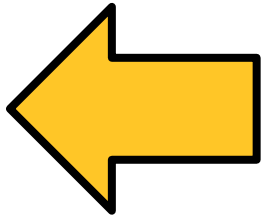
8. Close Client Connection
9. Continue Listening



1 Create input/output streams

2 Check for disconnect

3 Check Protocol

4 Read Headers

5 Handle Accordingly

SER 321

OSI Model

Unit	Layer	What we are *really* talking about
Data	Application	
Data	Presentation	
Data	Session	
Segment	Transport	
Packet	Network	
Frame	Data Link	
Bits	Physical	

SER 321

OSI Model

Unit	Layer	What we are *really* talking about	
Data	Application	HTTP(s), SMTP, FTP, IMAP, POP, etc.	Content/Payload Info
Data	Presentation	Translation, compression, encryption	
Data	Session	AuthN, authZ, session mgmt	
Segment	Transport	TCP/UDP	
Packet	Network	IP address, routing and delivery	Transmission Info
Frame	Data Link	LLC, MAC, data transmission in LAN	
Bits	Physical	Signal, Binary transmission	

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TCP vs. UDP Matching

Unreliable

TCP

OR

UDP

SER 321

TCP vs. UDP Matching

Connection-Oriented

TCP

Reliable

OR

UDP

Unreliable

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TCP vs. UDP Matching

Uses Streams

TCP	OR	UDP
Reliable		Unreliable
Connection-Oriented		Connectionless

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TCP vs. UDP Matching

Has Less Overhead

TCP	OR	UDP
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Uses Streams		Uses Datagrams

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TCP vs. UDP Matching

Has Less Overhead

TCP	OR	UDP
Reliable		Unreliable
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Uses Streams		Uses Datagrams
Has More Overhead		Has Less Overhead

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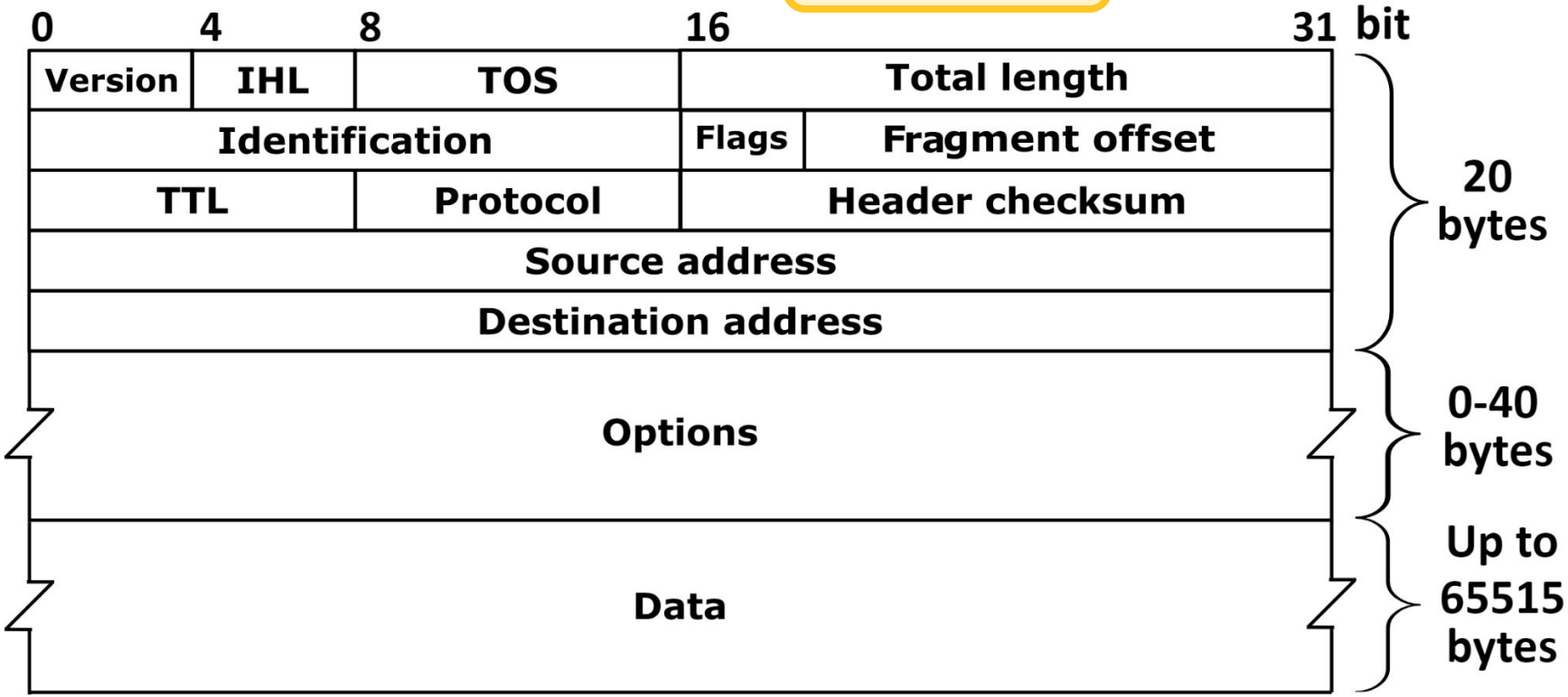
TCP vs. UDP Matching

TCP

OR

UDP

IP Header



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TCP vs. UDP Matching

TCP

OR

UDP

TCP segment header

Offsets		0								1								2								3							
Octet	Bit	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
0	0	Source port																Destination port															
4	32	Sequence number																															
8	64	Acknowledgment number (if ACK set)																															
12	96	Data offset				Reserved 0 0 0 0				CWR	ECE	URG	ACK	PSH	RST	SYN	FIN	Window Size															
16	128	Checksum																Urgent pointer (if URG set)															
20	160	Options (if *data offset* > 5. Padded at the end with "0" bits if necessary.)																															
⋮	⋮																																
56	448																																

UDP datagram header

Offsets	Octet	0								1								2								3							
Octet	Bit	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0	0	Source port																Destination port															
4	32	Length																Checksum															

SER 321

Scratch Space

Questions?

Survey:

http://bit.ly/ASN2324

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Upcoming Events

SI Sessions:

- Monday, June 10th at 6:00 pm MST
- Thursday, June 13th at 6:00 pm MST
- Sunday, June 16th at 6:00 pm MST

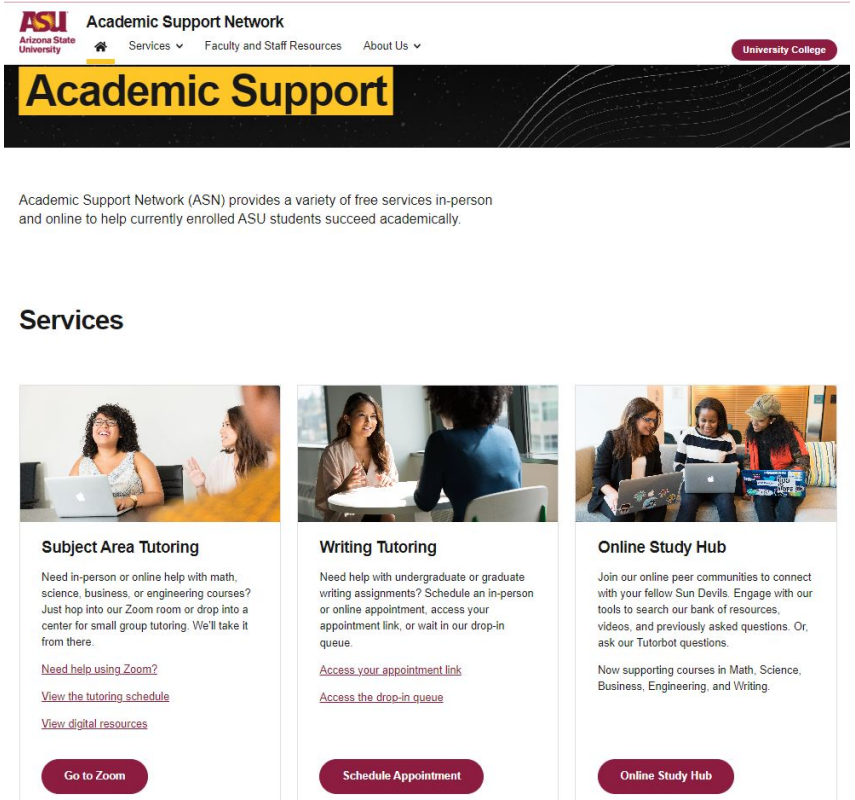
Review Sessions:

- Review Session - **Wednesday**, July 3rd at 6:00 pm MST (2 hr Session)
- Q&A Session - Sunday, July 7th at 6:00 pm MST (Final Session)

More Questions?

Check out our other resources!

tutoring.asu.edu



1 – Go to Zoom

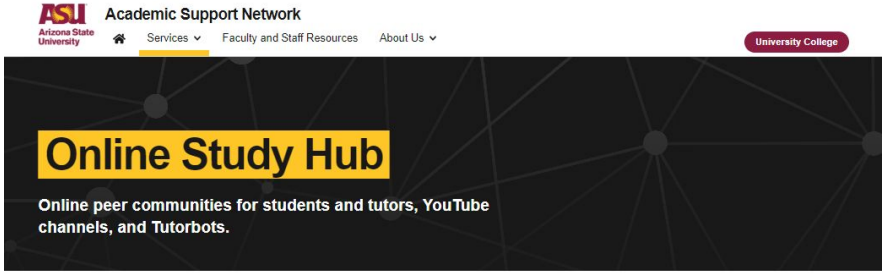
2- Need help using Zoom?
View the tutoring schedule
View digital resources

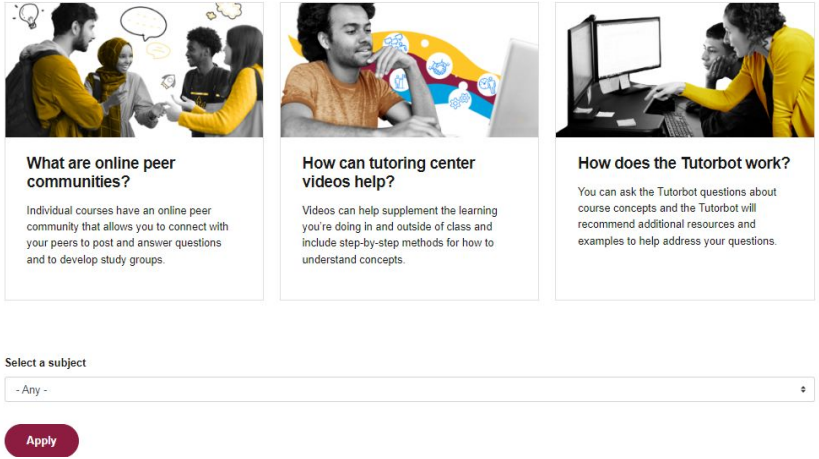
1. **Click on 'Go to Zoom' to log onto our Online Tutoring Center.**
2. **Click on 'View the tutoring schedule' to see when tutors are available for specific courses.**

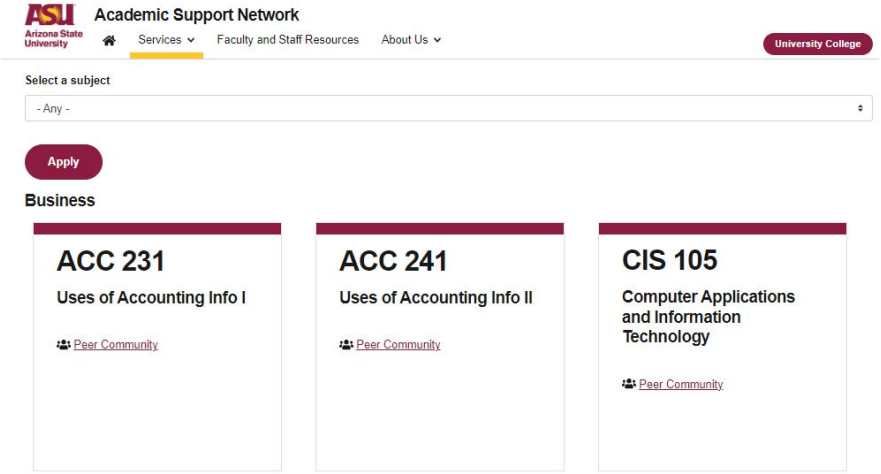
More Questions?

Check out our other resources!

tutoring.asu.edu/online-study-hub



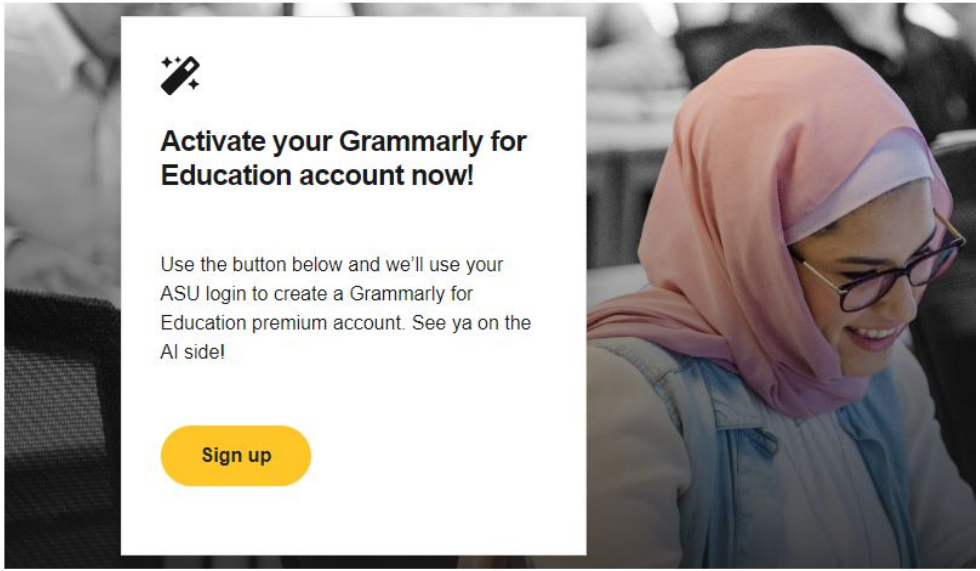




Don't forget to check out the Online Study Hub for additional resources!

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