SER 321 A Session

SI Session

Sunday, March 2nd 2025

7:00 pm - 8:00 pm MST

Agenda

Requested Content

Resume General 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
Review Requests

It's ***not*** too late to make a topic request!

Drop a concept in the chat and we can cover it next!

org.json Docs

JSON Guide

SER 321

JSON Structure

Data is stored in…

Name:Value pairs → AKA → Members

"Katie"

"student" : "Katie"

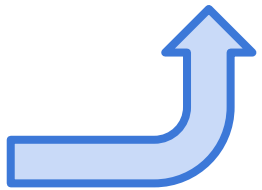
What uses curly braces?

Objects

{ }

What do Objects contain?

Members



org.json Docs

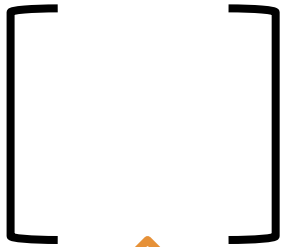
JSON Guide

SER 321

JSON Structure

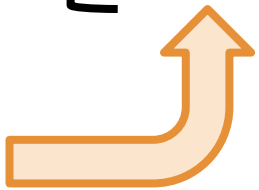
What uses brackets?

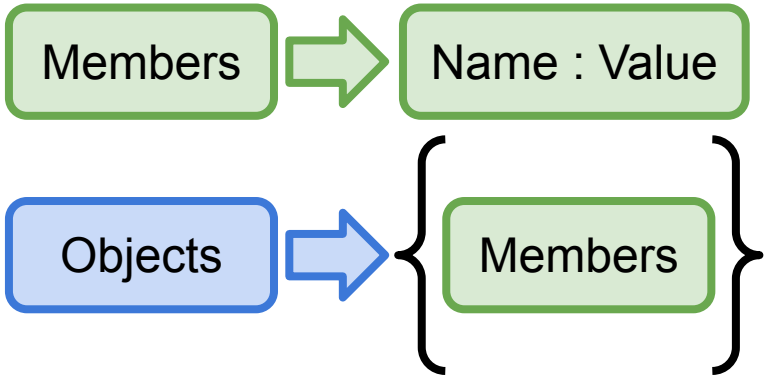
Arrays



What do Arrays contain?

Any ***Valid*** Value





org.json Docs

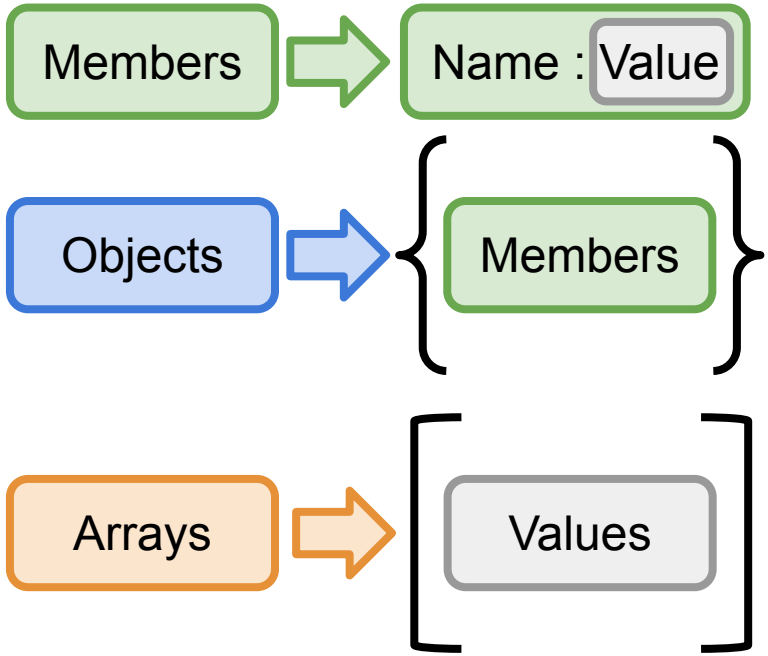
JSON Guide

SER 321

JSON Structure

What is a valid value?

- Strings
- Booleans
- Numbers
- NULL
- Objects
- Arrays



SER 321
Serialization

Can we recall some of the formats?

JSON

Java Object Serialization

Protocol Buffers

XML

SER 321
Serialization

Binary

Text

Two main approaches for storing the content…

What about the data format?

JSON

Java Object Serialization

Protocol Buffers

XML

SER 321
Serialization

Binary

Text

Who uses *TEXT*?

Text

JSON

Java Object Serialization

Protocol Buffers

Text

XML

SER 321
Serialization

Binary

Text

What does this imply?

Who uses ***BINARY***?

Text JSON

Binary Java Object Serialization

Binary Protocol Buffers

Text XML

SER 321
Serialization

Streams and their types

Generic Superclass

```
OutputStream out = sock.getOutputStream();
```

Buffered Stream

Bytes

Data Stream

Primitive DATA Types

Object Stream

Java Objects

org.json Docs

JSON Guide

SER 321

JSON Recognition


```
{
  "lat": 42.3434,
  "lon": -88.0412,
  "timezone": "America/Chicago",
  "timezone_offset": -21600,
  "current": {
    "dt": 1733070576,
    "sunrise": 1733058144,
```


How to make an API call

API call


```
https://api.openweathermap.org/data/3.0/onecall?lat=
{lat}&lon={lon}&exclude={part}&appid={API key}
```

https://api.openweathermap.org/data/3.0/onecall?lat=42.3433518&lon=-88.0412192&exclude


```
      "icon": "01d"
    }
  ]
 }
}
```

org.json Docs

SER 321

JSON Recognition

How many Objects?

How many Arrays?

How many Members?


```
{
  "lat": 42.3434,
  "lon": -88.0412,
  "timezone": "America/Chicago",
  "timezone_offset": -21600,
  "current": {
    "dt": 1733070576,
    "sunrise": 1733058144,
    "sunset": 1733091649,
    "temp": 18.57,
    "feels_like": 5.97,
    "pressure": 1025,
    "humidity": 63,
    "dew_point": 9.21,
    "uvi": 0.79,
    "clouds": 0,
    "visibility": 10000,
    "wind_speed": 14.97,
    "wind_deg": 280,
    "wind_gust": 21.85,
    "weather": [
      {
        "id": 800,
        "main": "Clear",
        "description": "clear sky",
        "icon": "01d"
      }
    ]
  }
}
```


JSON Guide

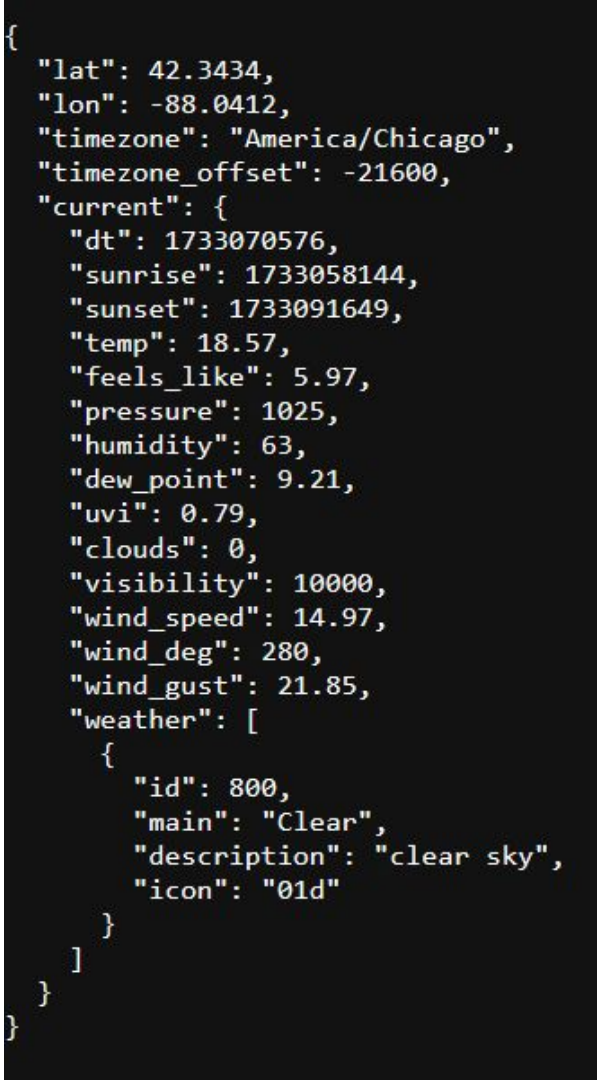
org.json Docs

JSON Guide

SER 321

JSON Practice

```
JSONObject json =
```



```
{
  "lat": 42.3434,
  "lon": -88.0412,
  "timezone": "America/Chicago",
  "timezone_offset": -21600,
  "current": {
    "dt": 1733070576,
    "sunrise": 1733058144,
    "sunset": 1733091649,
    "temp": 18.57,
    "feels_like": 5.97,
    "pressure": 1025,
    "humidity": 63,
    "dew_point": 9.21,
    "uvi": 0.79,
    "clouds": 0,
    "visibility": 10000,
    "wind_speed": 14.97,
    "wind_deg": 280,
    "wind_gust": 21.85,
    "weather": [
      {
        "id": 800,
        "main": "Clear",
        "description": "clear sky",
        "icon": "01d"
      }
    ]
  }
}
```

How would we…

Check for the timezone member?

```
boolean hasTimezone =
```

Get the timezone?

```
String timezone =
```

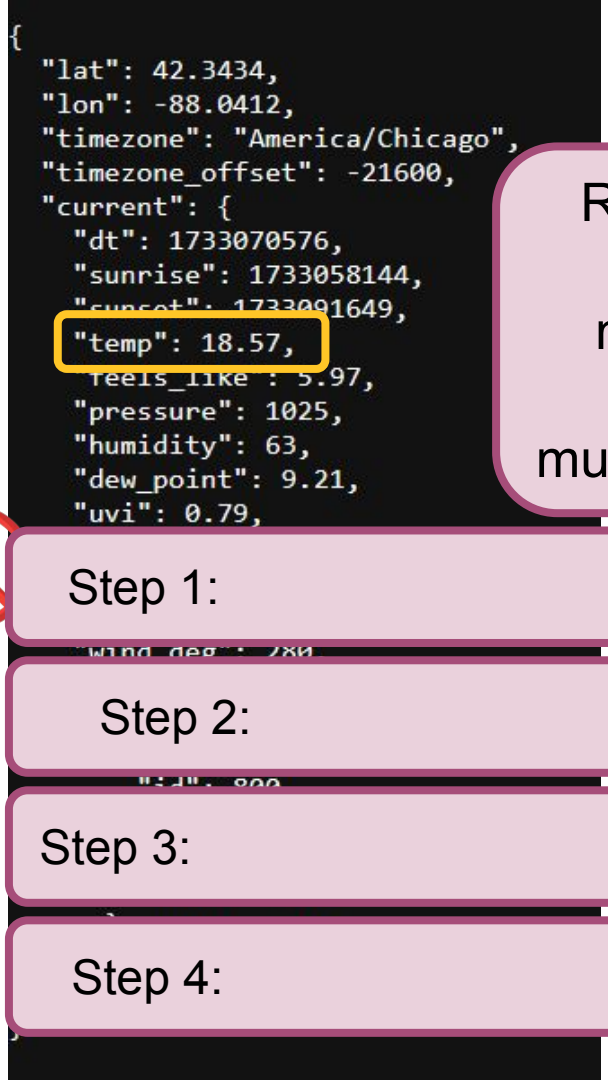
org.json Docs

JSON Guide

SER 321

JSON Practice

```
JSONObject json =
```



How would we…

Obtain the temp value?

~~`String temp = json.getString("temp");`~~

Recall that nested members require multiple steps!

Step 1:

Step 2:

Step 3:

Step 4:

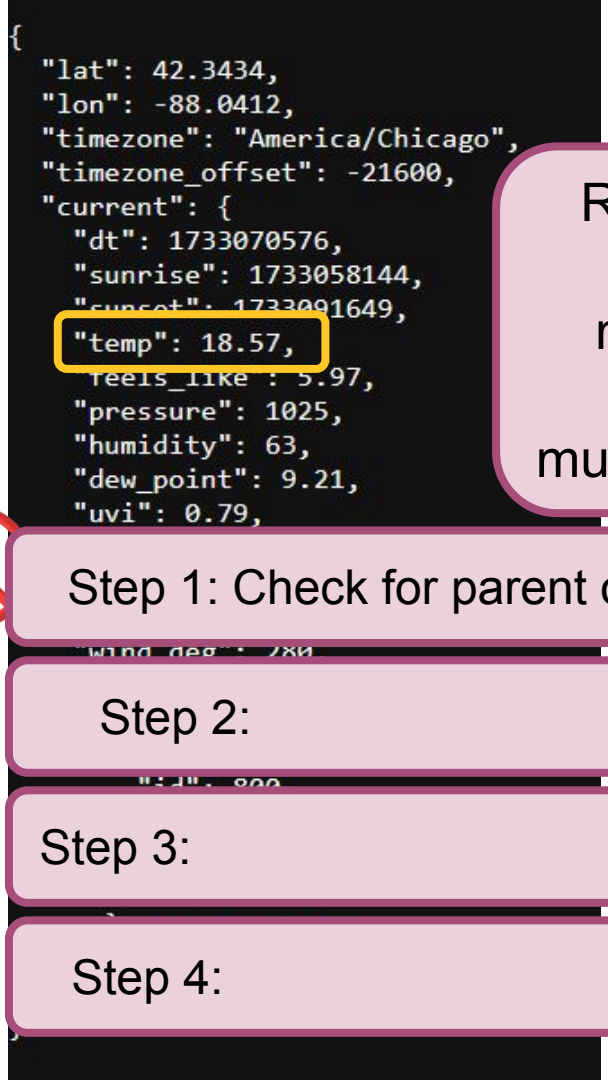
org.json Docs

JSON Guide

SER 321

JSON Practice

```
JSONObject json =
```



How would we…

Obtain the temp value?

~~`String temp = json.getString("temp");`~~

```
if (json.has("current") {

}
```

Recall that nested members require multiple steps!

Step 1: Check for parent object

Step 2:

Step 3:

Step 4:

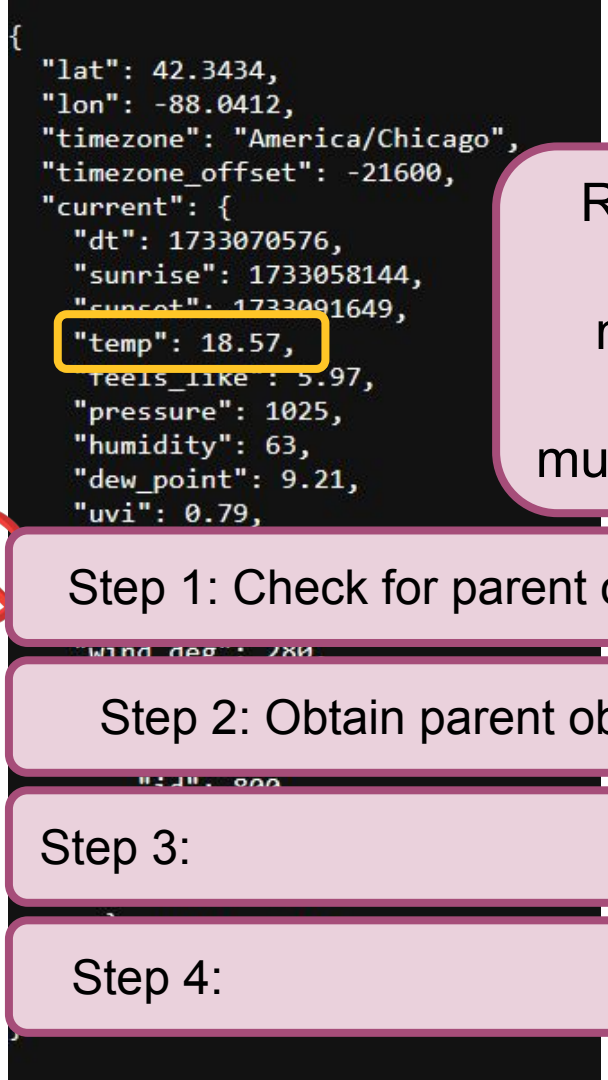
org.json Docs

JSON Guide

SER 321

JSON Practice

```
JSONObject json =
```



How would we…

Obtain the temp value?

~~`String temp = json.getString("temp");`~~

```
if (json.has("current") {
    JSONObject current =
            json.getObject("current");


 }
```

Recall that nested members require multiple steps!

Step 1: Check for parent object

Step 2: Obtain parent object

Step 3:

Step 4:

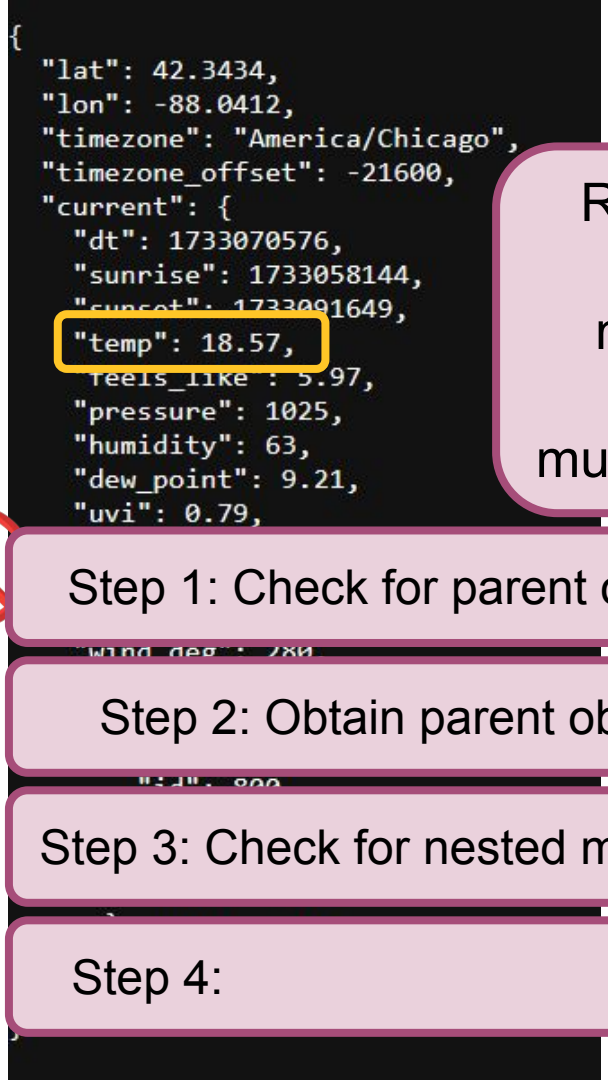
org.json Docs

JSON Guide

SER 321

JSON Practice

JSONObject json =



How would we…

Obtain the temp value?

~~String temp = json.getString("temp");~~

```
if (json.has("current") {
    JSONObject current =
            json.getObject("current");
    if (current.has("temp")) {
       temp = current.getString("temp");
}
```

Recall that nested members require multiple steps!

Step 1: Check for parent object

Step 2: Obtain parent object

Step 3: Check for nested member

Step 4:

org.json Docs

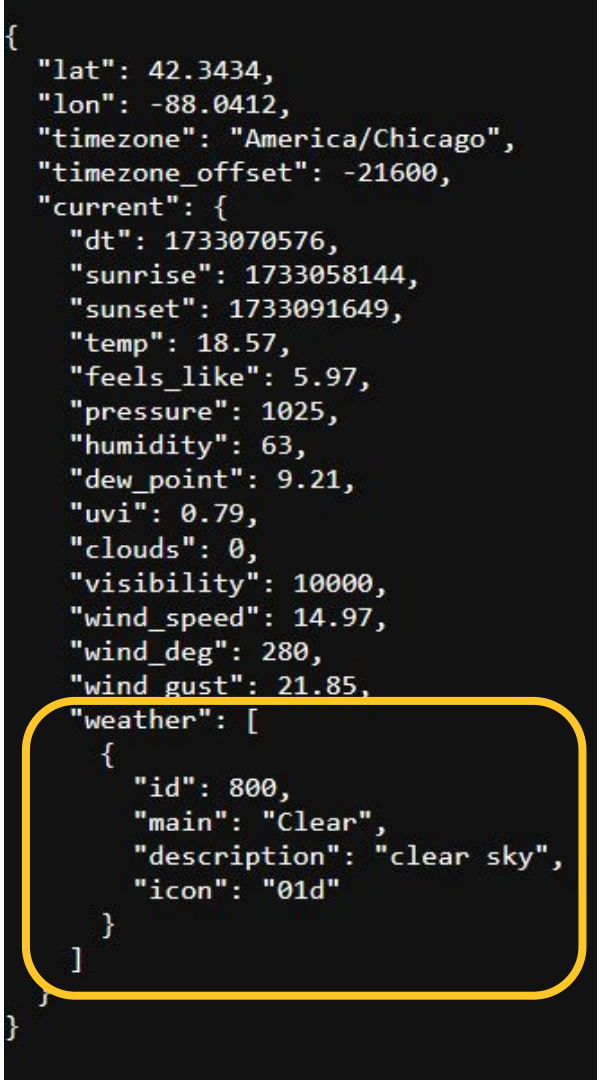
JSON Guide

SER 321

JSON Practice

JSONObject json =

How would we create the "weather" object?



```
{
  "lat": 42.3434,
  "lon": -88.0412,
  "timezone": "America/Chicago",
  "timezone_offset": -21600,
  "current": {
    "dt": 1733070576,
    "sunrise": 1733058144,
    "sunset": 1733091649,
    "temp": 18.57,
    "feels_like": 5.97,
    "pressure": 1025,
    "humidity": 63,
    "dew_point": 9.21,
    "uvi": 0.79,
    "clouds": 0,
    "visibility": 10000,
    "wind_speed": 14.97,
    "wind_deg": 280,
    "wind_gust": 21.85,
    "weather": [
      {
        "id": 800,
        "main": "Clear",
        "description": "clear sky",
        "icon": "01d"
      }
    ]
  }
}
```

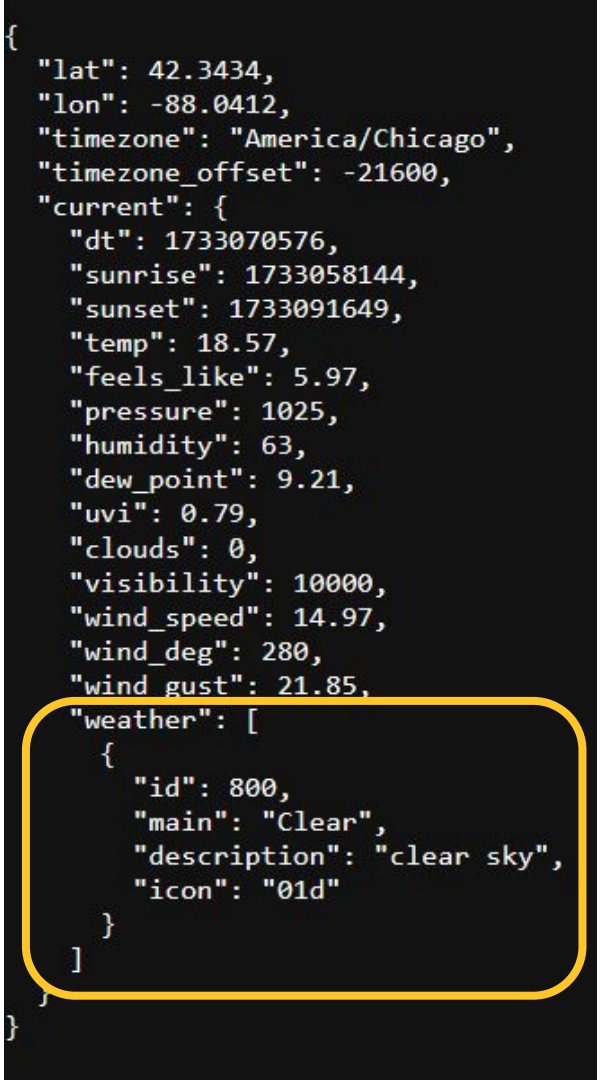
org.json Docs

JSON Guide

SER 321

JSON Practice

JSONObject json =



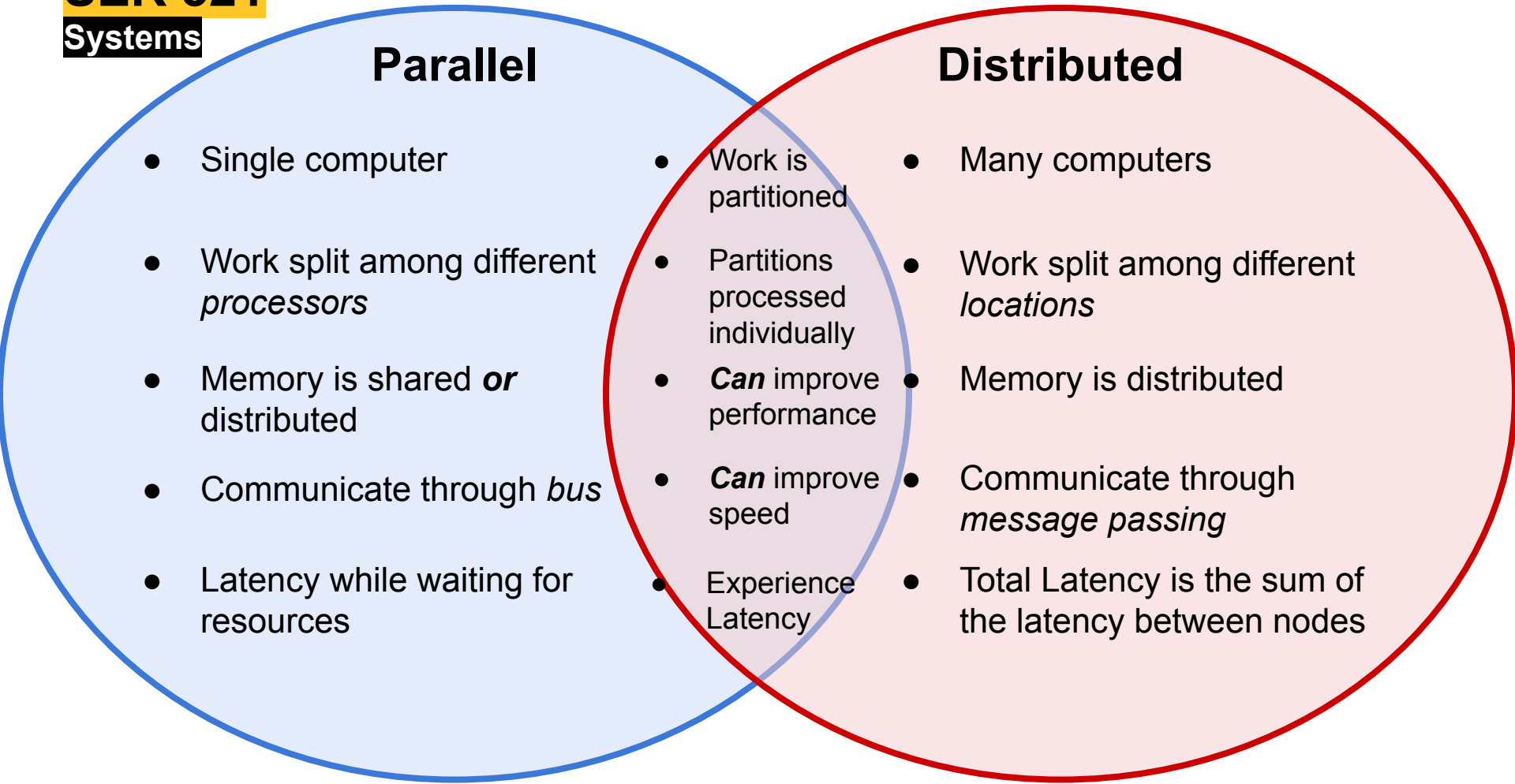
How would we create the "weather" object?

```
JSONObject curr = new JSONObject();
JSONObject weather = new JSONArray();
JSONObject content = new JSONObject();
content.put("id", 800);
content.put("main", "Clear");
content.put("description", "clear sky");
content.put("icon", "01d");

weather.put(content.toMap());

curr.put(weather.toMap());
```

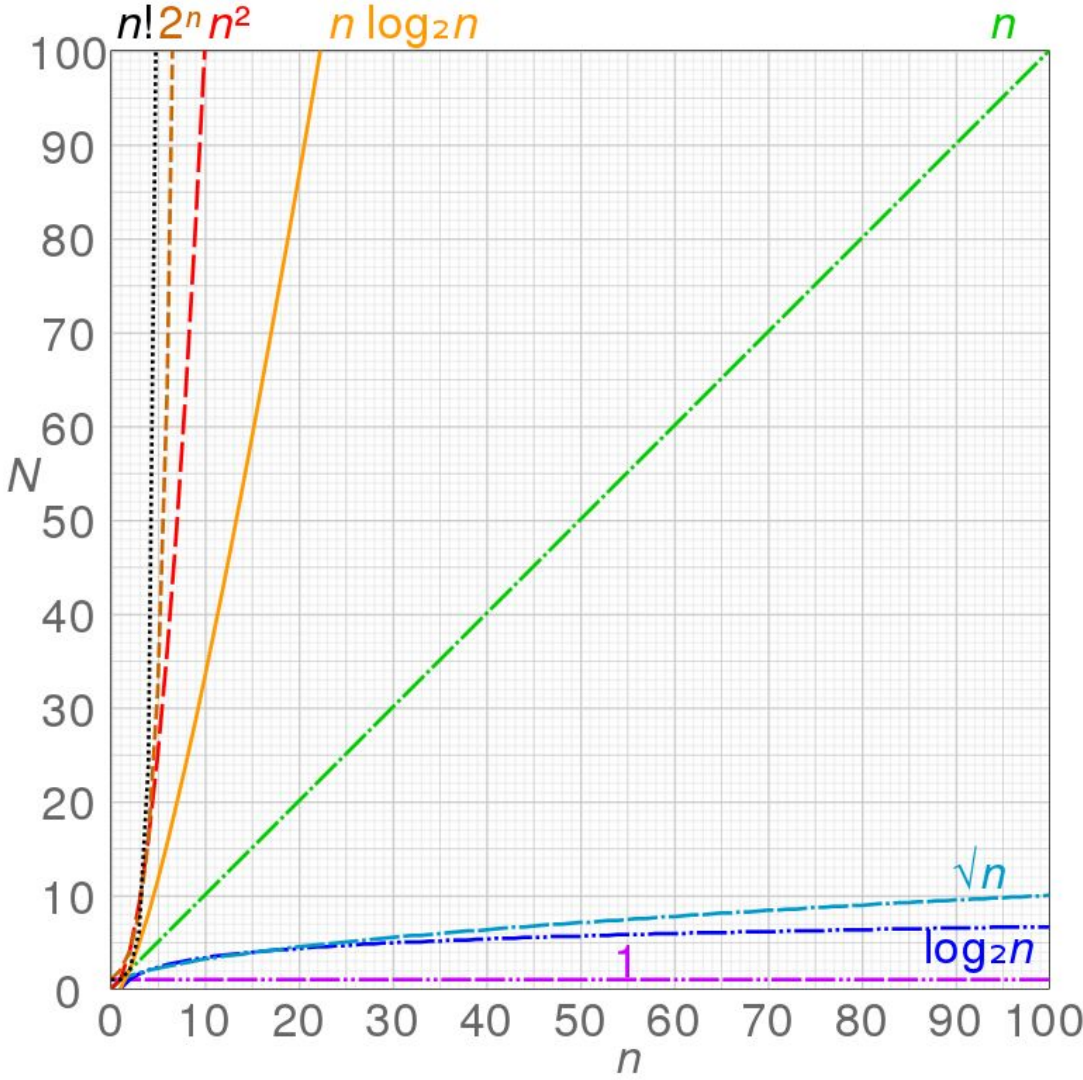
SER 321
Systems



SER 321

When to Distribute

When should we *consider* distributing?

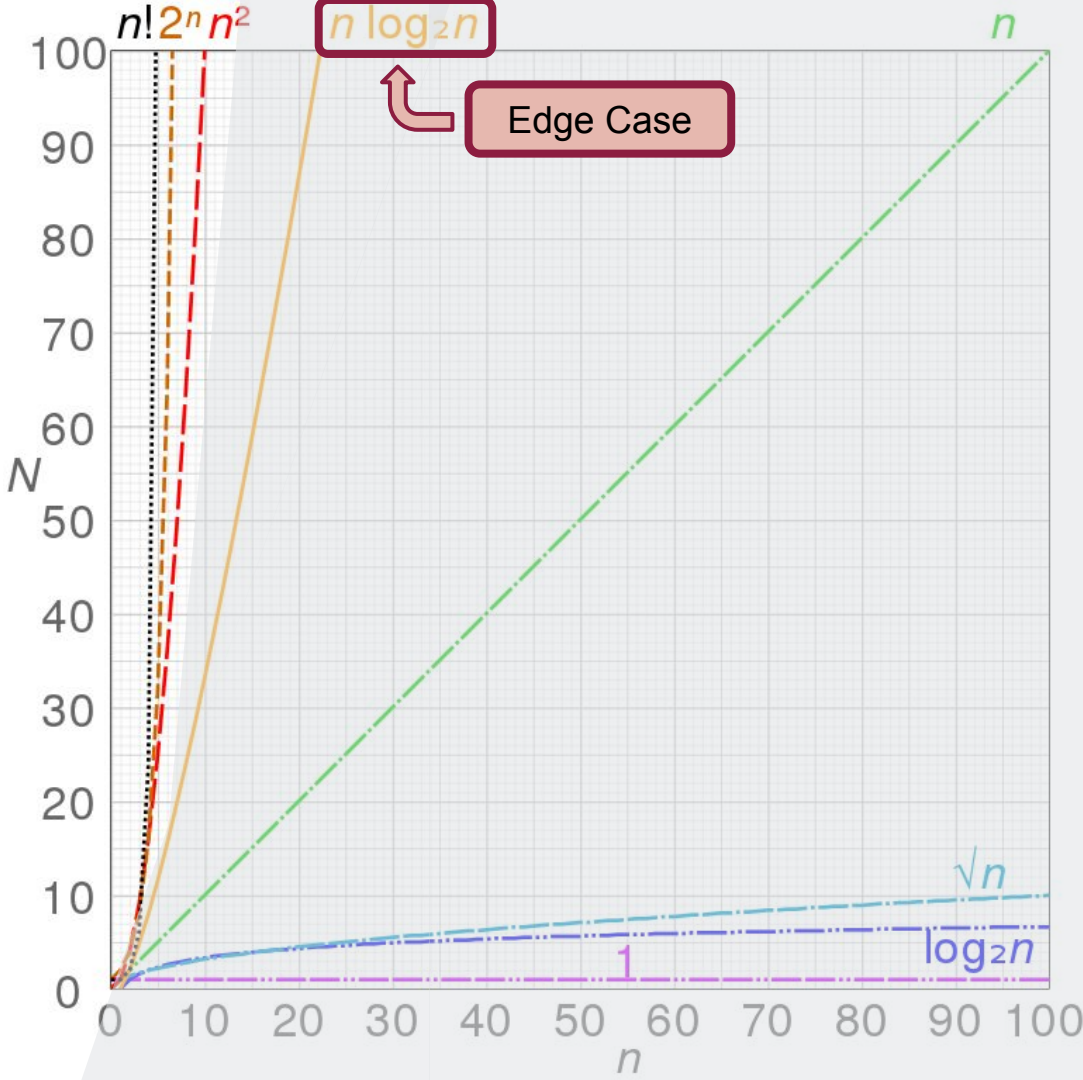


SER 321

When to Distribute

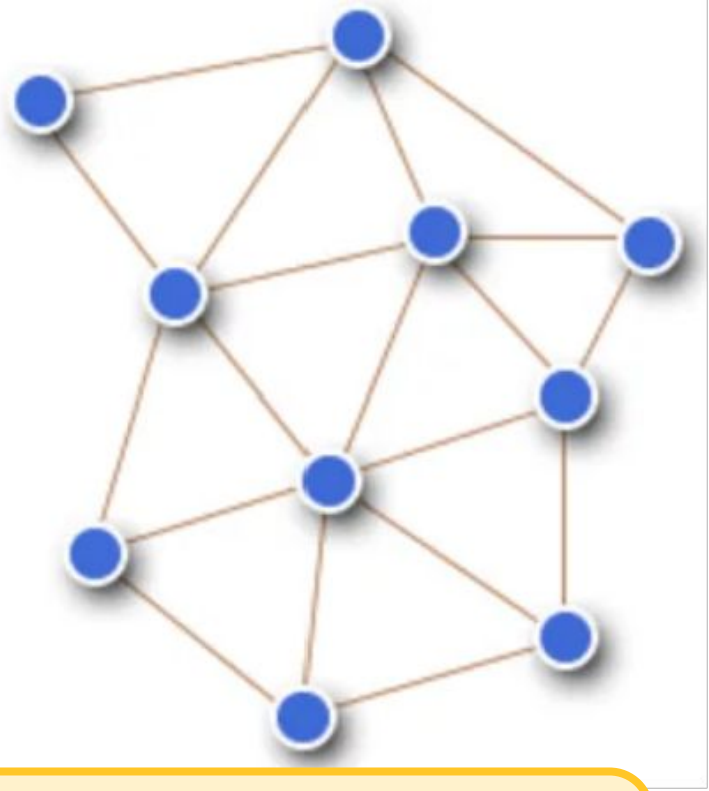
When should we *consider* distributing?

Super Duper Extra Extra Large Orders of Magnitude!



SER 321
Distributed Issues

Remember that we are operating in ***reality***



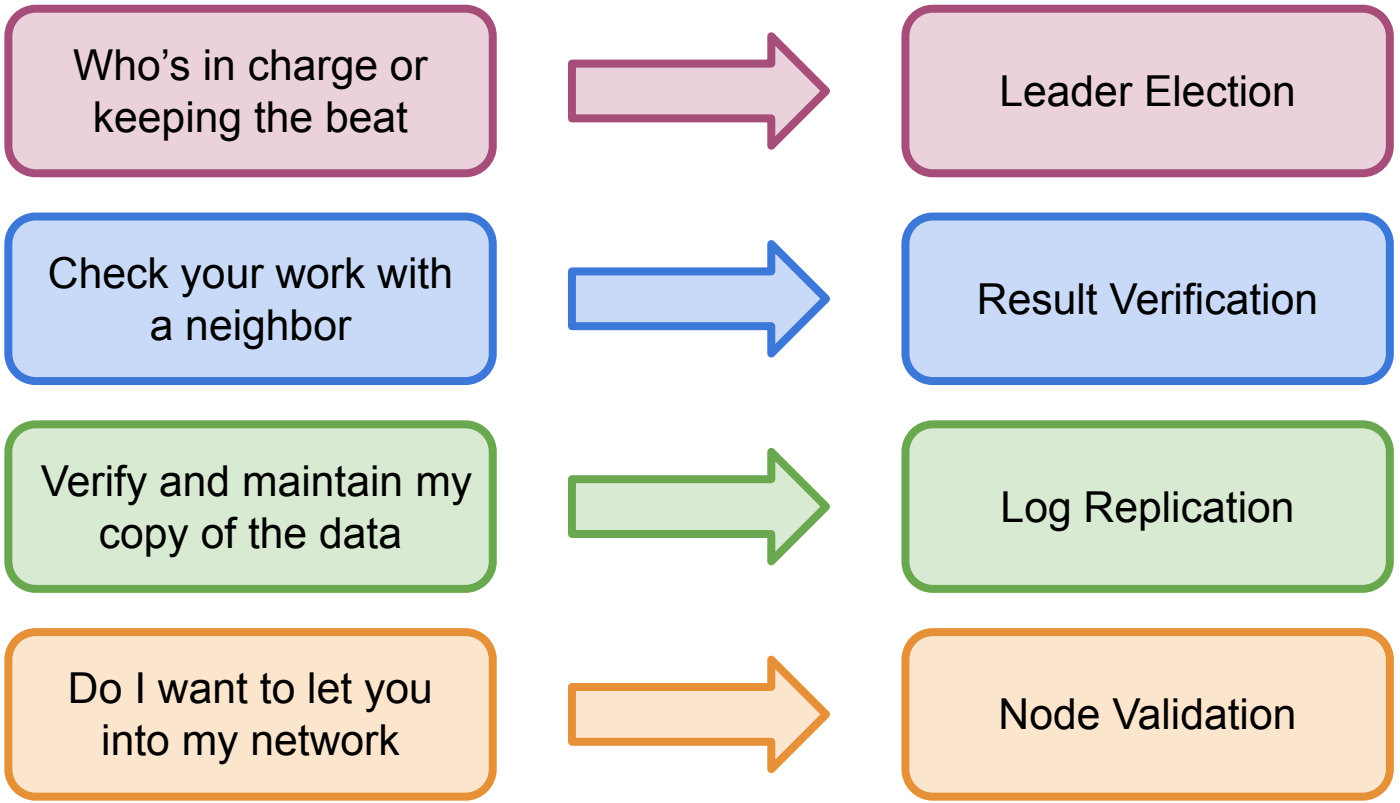
- No Global Clock
- Nodes *will* fail
- Web of nodes *will constantly* change
- Network is not *always* reliable
- Latency is *always present*
- The path traversed *changes*
- Some resources *must be shared*
- *You* need to prevent the pitfalls!
  - No deadlocks
  - No starvation
  - No error states

Word Search
or
Raw Recall?

SER 321
Consensus

What is Consensus?

"General agreement or trust amongst a group"

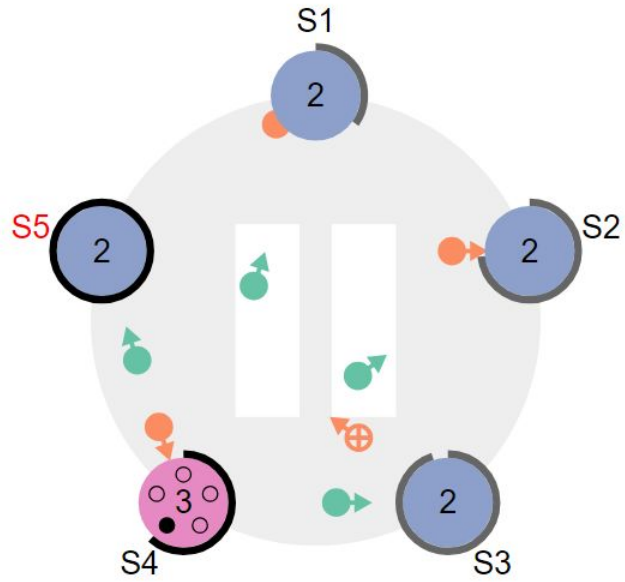


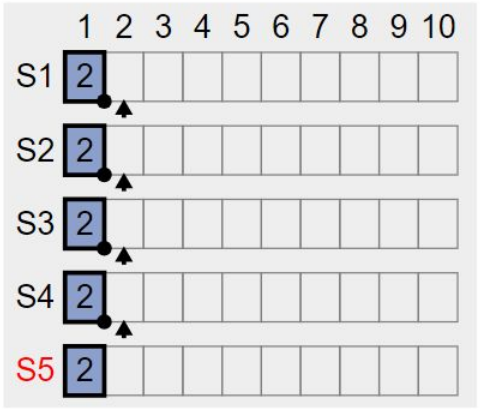
SER 321

RAFT

How do we feel about Consensus?

Do we want to look at RAFT again?





SER 321
Middleware

We have been:

- Serializing Messages
- Sending Messages
- Parsing Messages
- Handle Messages

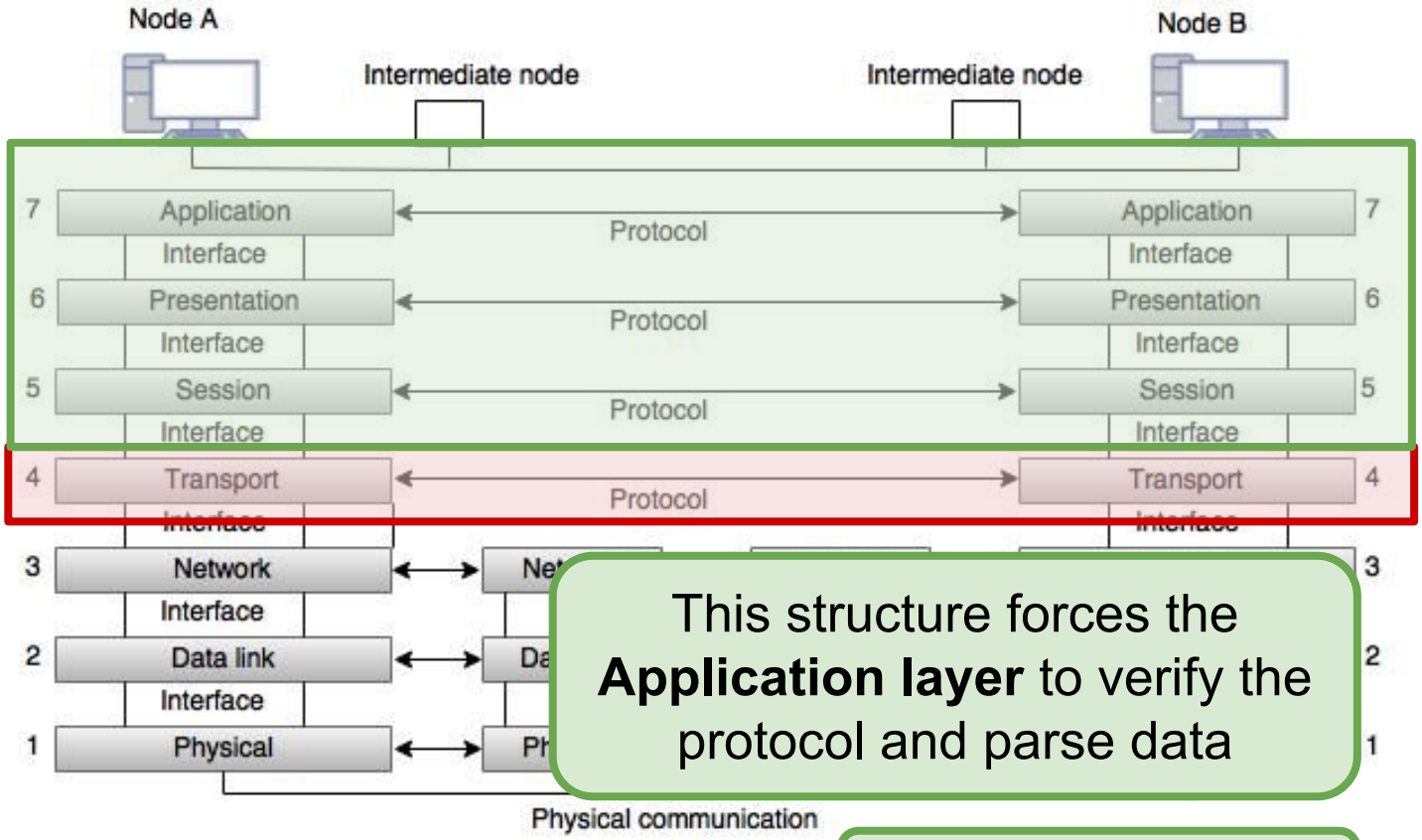


Fig: OSI Model

This structure forces the **Application layer** to verify the protocol and parse data

Not really its job…

SER 321
Middleware

With Middleware:

- Serializing Messages
- Sending Messages
- Parsing Messages
- Handle Messages

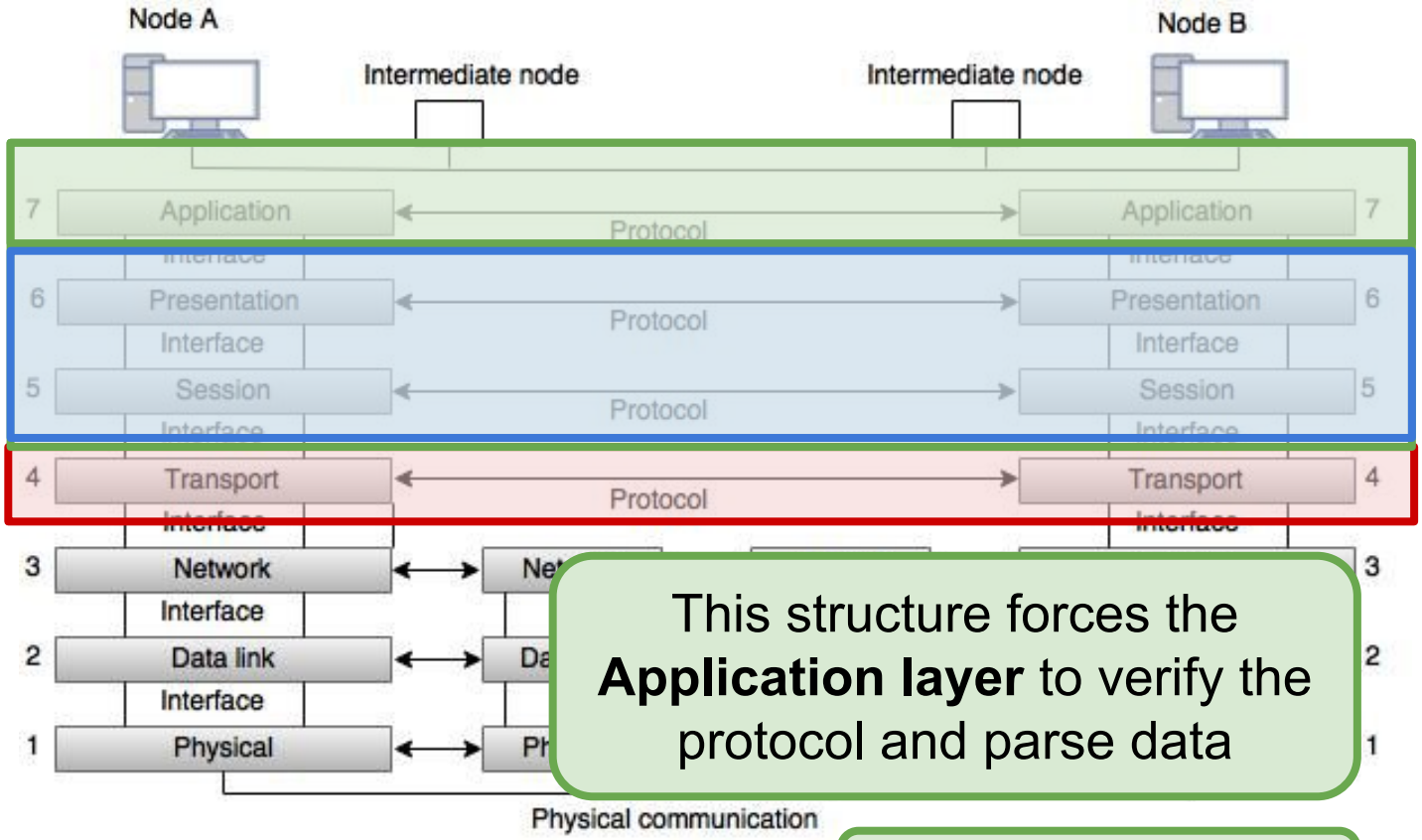


Fig: OSI Model

This structure forces the **Application layer** to verify the protocol and parse data

Not really its job…

SER 321
Middleware

With Middleware:

Serializing Messages

Sending Messages

Parsing Messages

Handle Messages

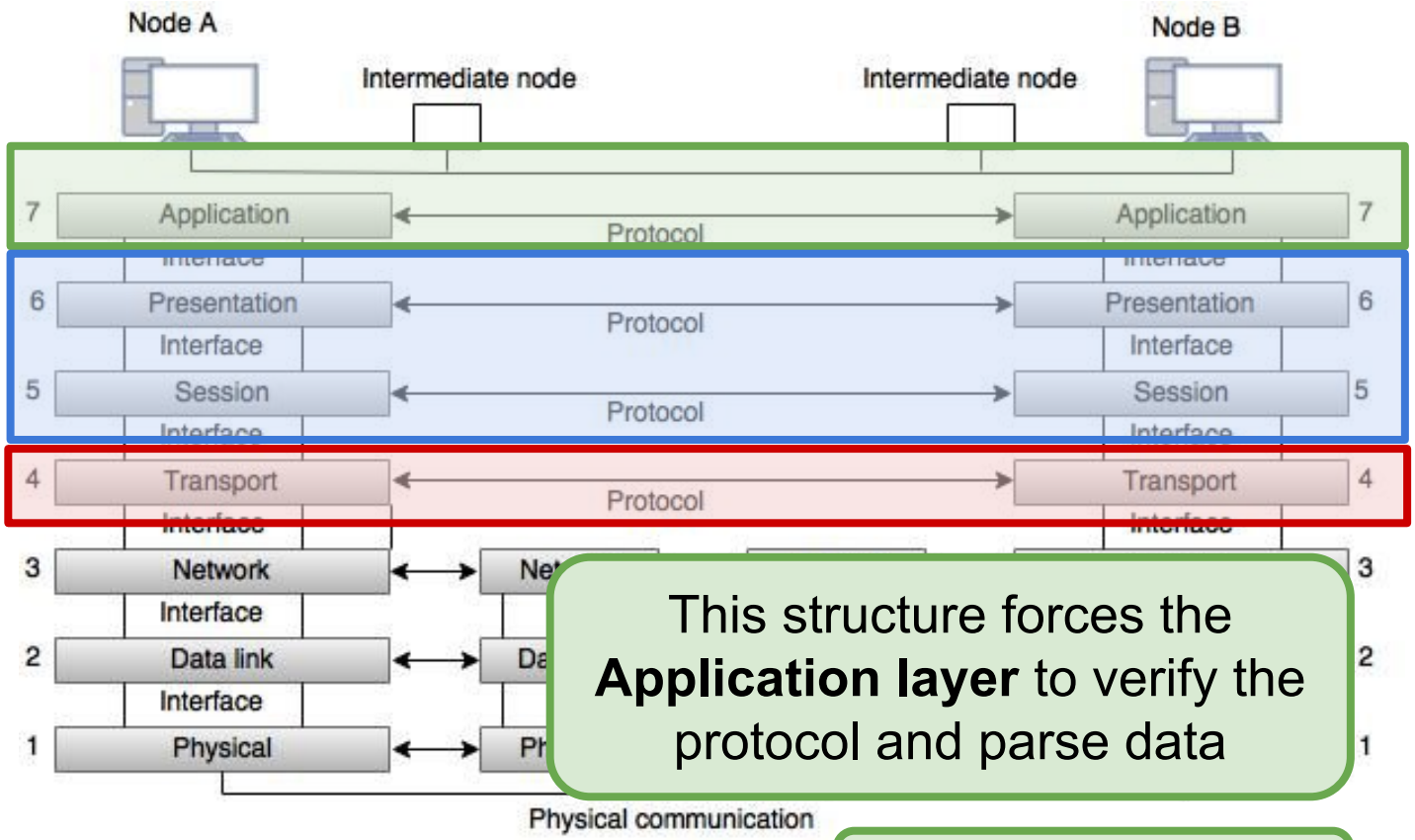


Fig: OSI Model

This structure forces the **Application layer** to verify the protocol and parse data

Not really its job…

SER 321
Middleware

Middleware:

Session Layer Responsibilities:

Authentication

Authorization

Session Management

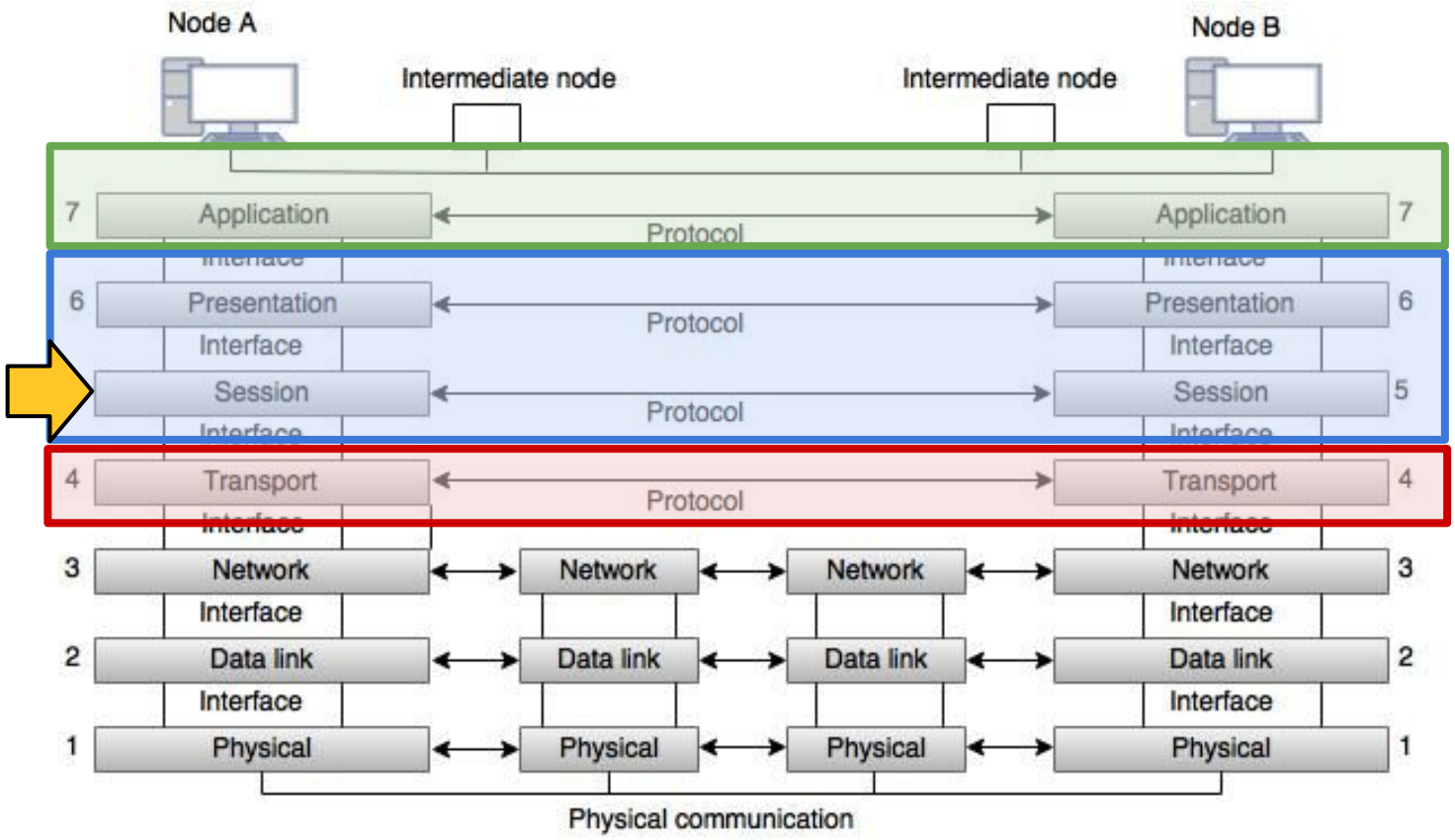


Fig: OSI Model

SER 321
Middleware

Middleware:

Presentation Layer Responsibilities:

Translation

Compression

Encryption

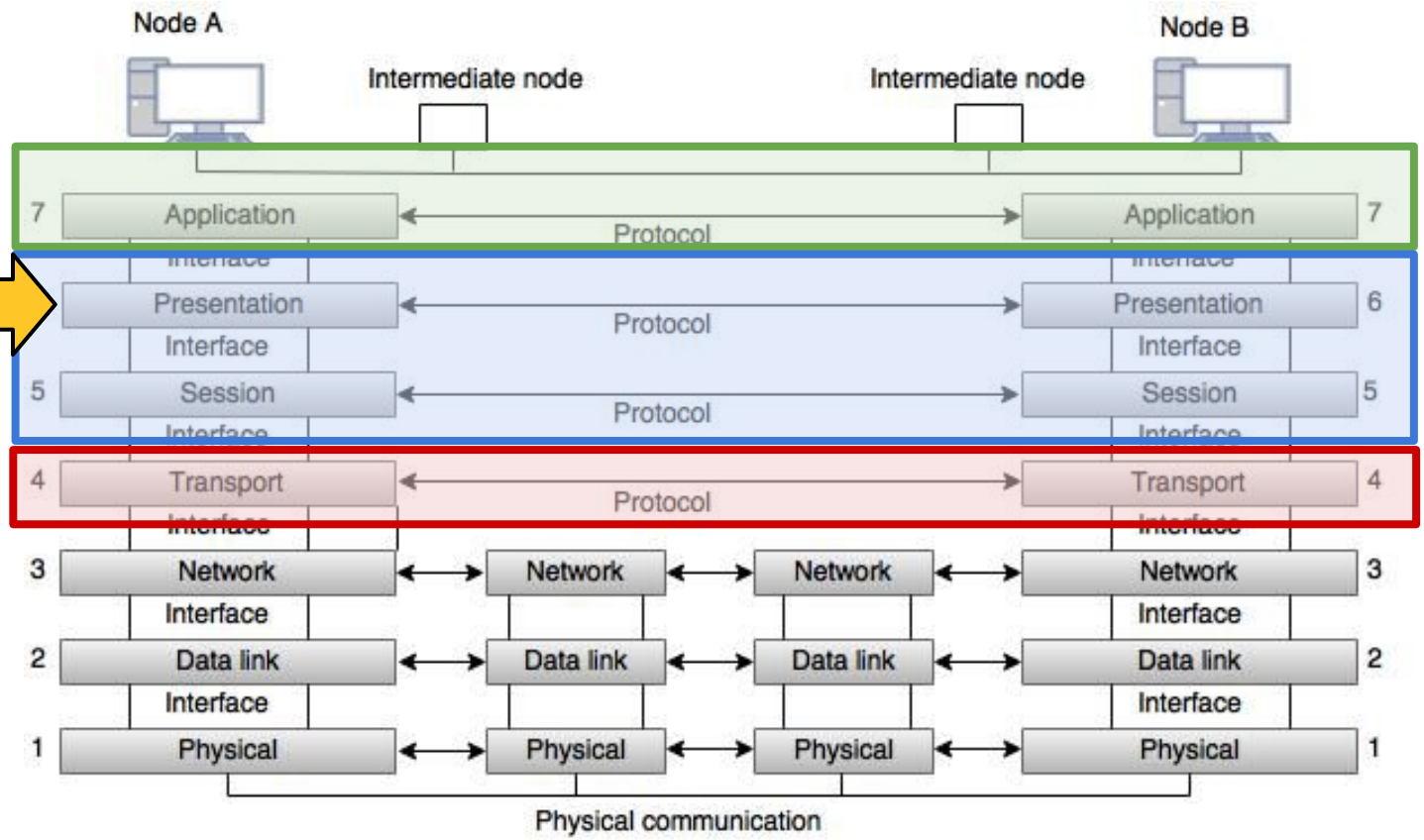


Fig: OSI Model

SER 321

Middleware Examples

Examples?

Message Oriented Middleware (MOM)

Web Frameworks

Remote Procedure Calls (RPC)

App. Programming Interface (API)

SER 321
Middleware Benefits

Why do we care?

Agility

Reusability

Efficiency

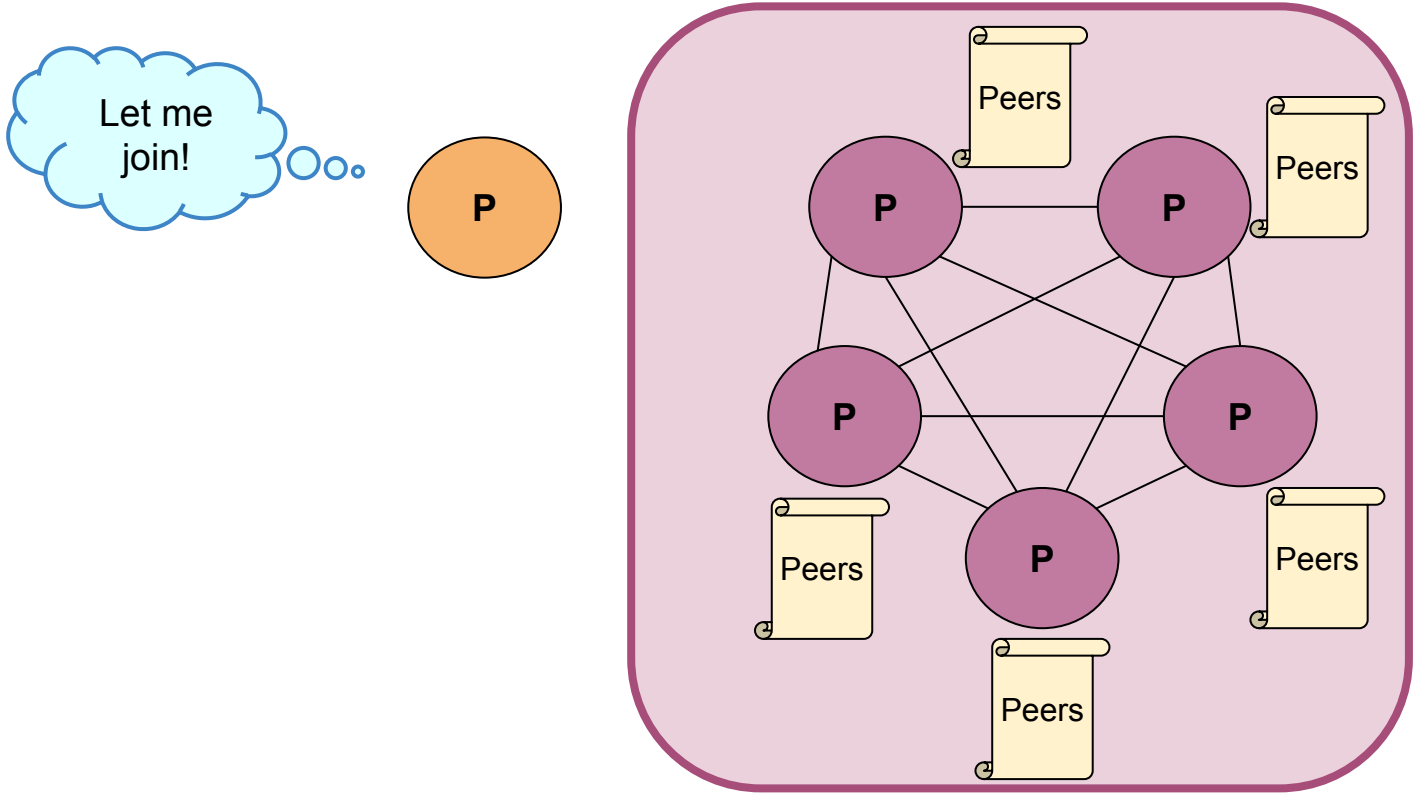
Cost Effectiveness

Portability

TL;DR → It's the "glue" between the client and server

SER 321
Communication

What about ***adding*** a Peer to the Cluster?

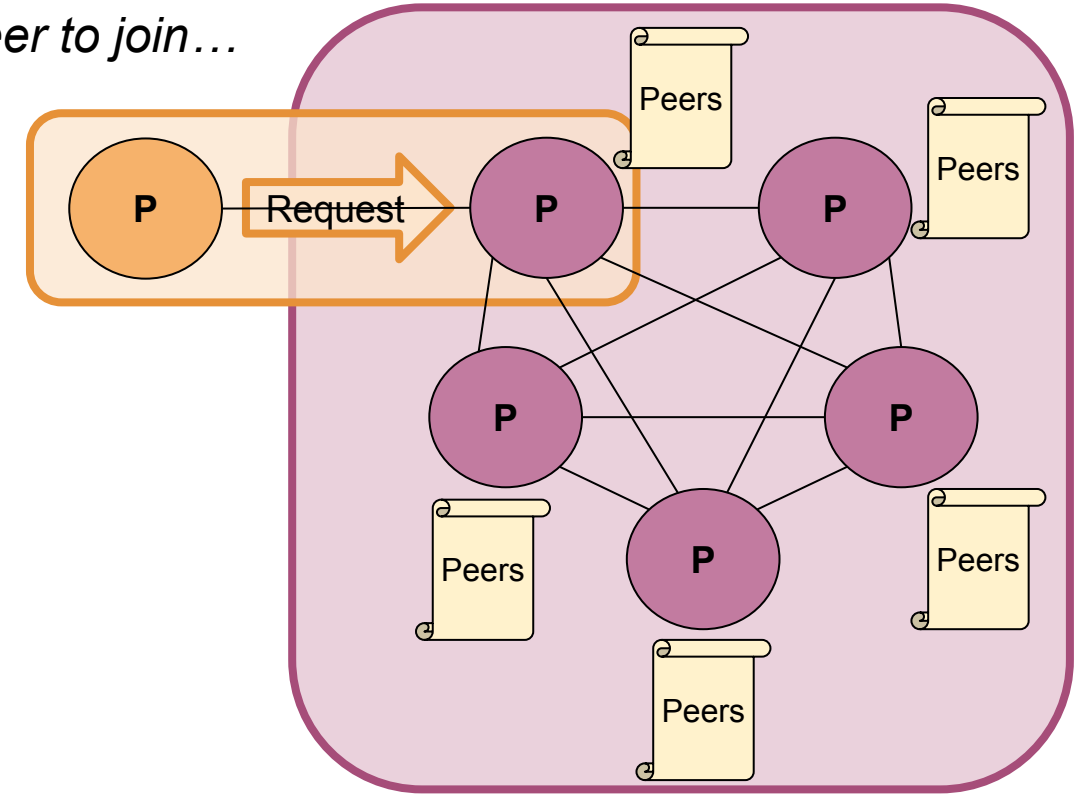


SER 321
Communication

What about ***adding*** a Peer to the Cluster?

Assuming we want to allow the peer to join…

Is that all?



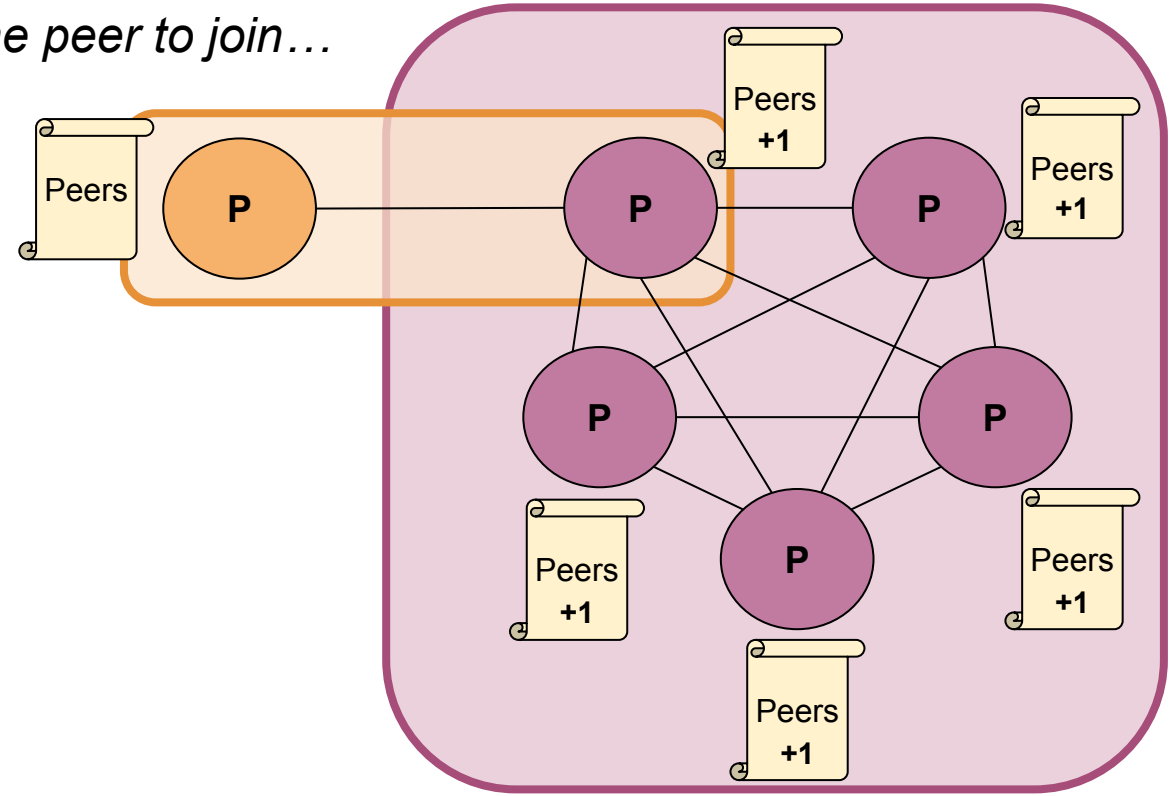
SER 321
Communication

What about ***adding*** a Peer to the Cluster?

Assuming we want to allow the peer to join…

Three Additional Steps:

1.
2.
3.



SER 321

Scratch Space

Questions?

Survey:

https://asuasn.info/ASNSurvey

40

Upcoming Events

SI Sessions:

- Sunday, March 2nd at 7:00 pm MST - **Q&A Session**

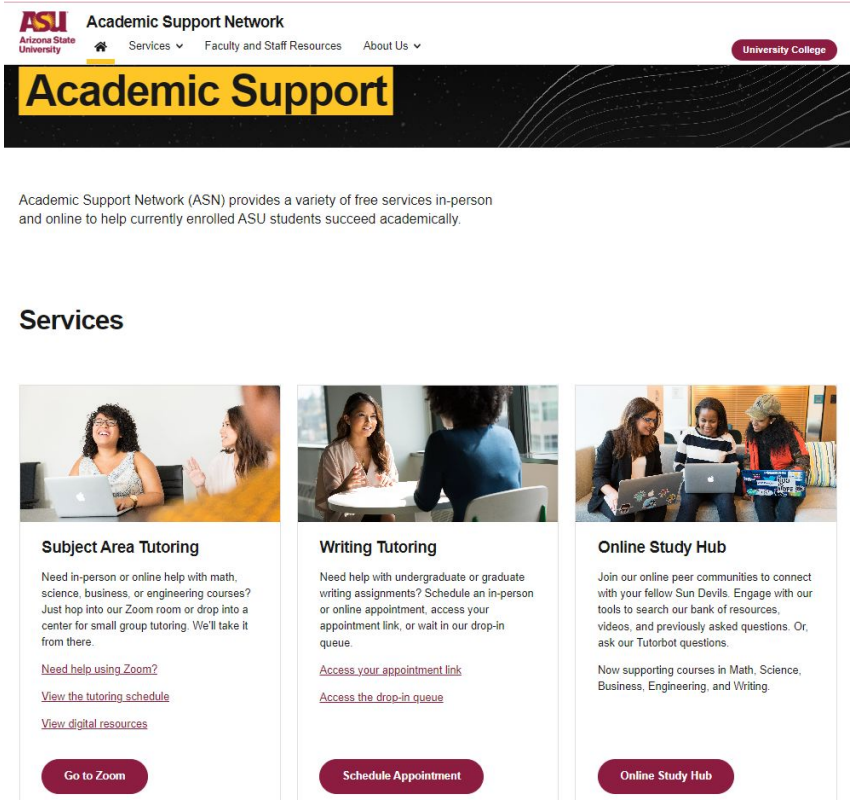
Review Sessions:

- Thursday, February 27th at 7:00 pm MST - **Exam Review Session (2hrs)**
- Sunday, March 2nd at 7:00 pm MST - **Q&A Session**

More Questions?

Check out our other resources!

tutoring.asu.edu

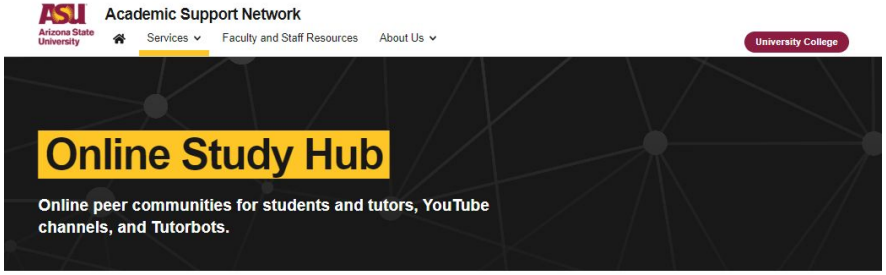


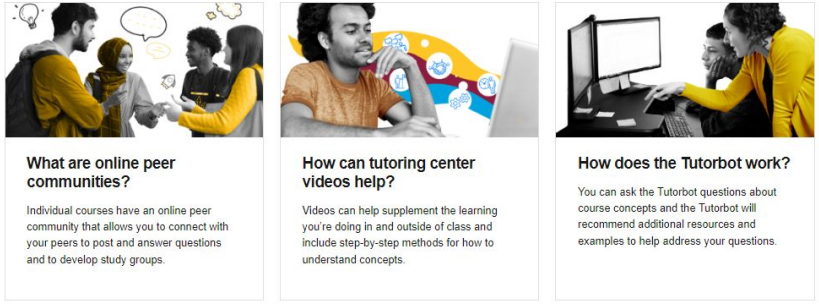
1. **Click on ‘Go to Zoom’ to log onto our Online Tutoring Center.**
2. **Click on ‘View the tutoring schedule’ to see when tutors are available for specific courses.**

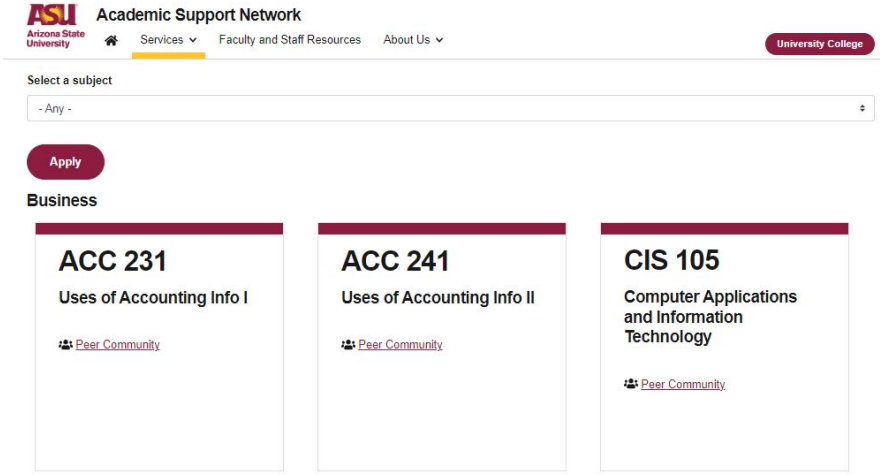
More Questions?

Check out our other resources!

tutoring.asu.edu/online-study-hub



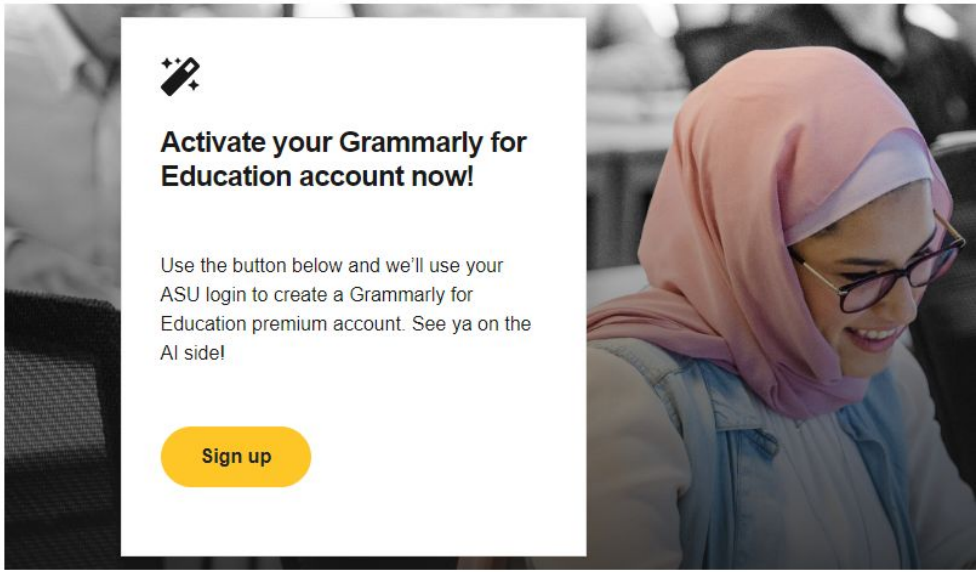




Don't forget to check out the Online Study Hub for additional resources!

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