

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

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Review Requests

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

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

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JSON Structure

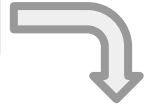
Data is stored in...

Name:Value pairs

AKA

Members

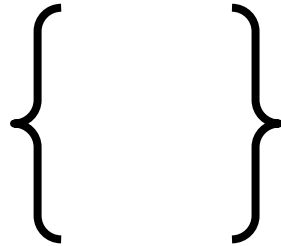
"Katie"



"student" : "Katie"

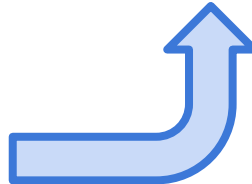
What uses curly braces?

Objects



What do Objects contain?

Members



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JSON Structure

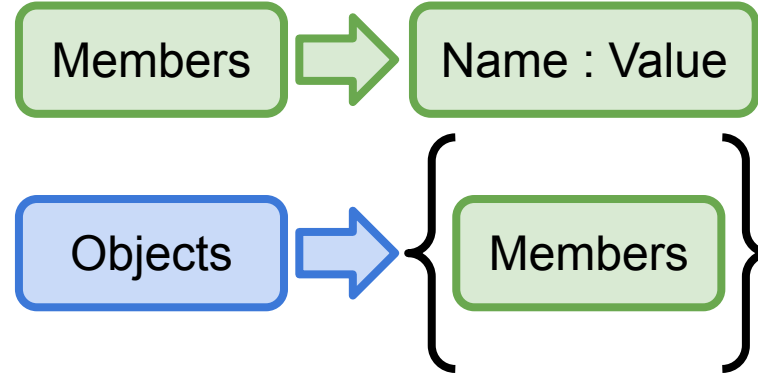
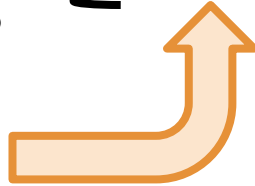
What uses brackets?

Arrays

[]

What do Arrays contain?

Any ***Valid*** Value



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JSON Structure

What is a valid value?

Strings

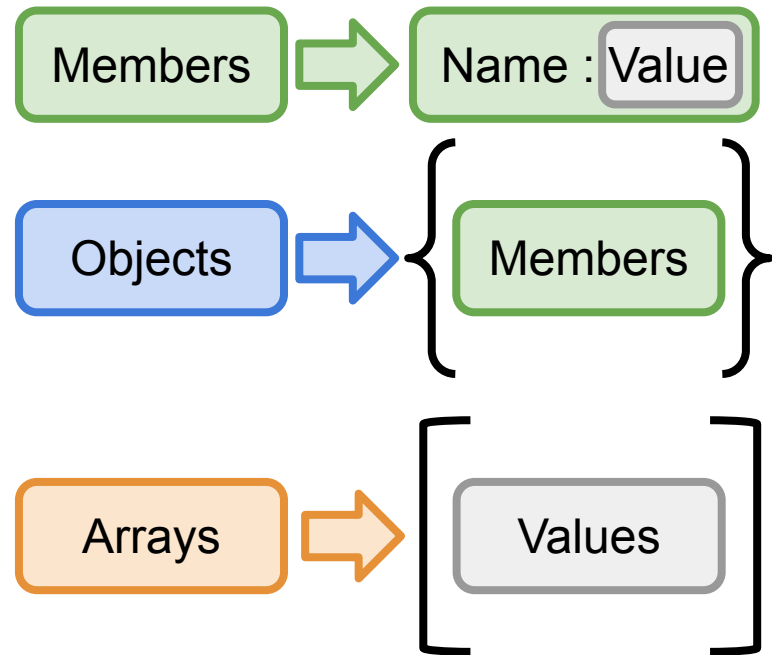
Booleans

Numbers

NULL

Objects

Arrays



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Serialization

Can we recall some of the formats?

JSON

Java Object
Serialization

Protocol Buffers

XML

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Serialization

Binary

Text

Two main
approaches for
storing the
content...

What about the data format?

JSON

Java Object
Serialization

Protocol Buffers

XML

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Serialization

Binary

Text

Who uses *TEXT*?

Text

JSON

Java Object
Serialization

Protocol Buffers

Text

XML

Binary

Text

What does
this imply?

Who uses ***BINARY***?

Text

JSON

Binary

Java Object
Serialization

Binary

Protocol Buffers

Text

XML

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Serialization

Generic
Superclass

Streams and their types

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

Buffered Stream

Bytes

Data Stream

Primitive DATA Types

Object Stream

Java Objects

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JSON Recognition

```
{  
  "lat": 42.3434,  
  "lon": -88.0412,  
  "timezone": "America/Chicago",  
  "timezone_offset": -21600,  
  "current": {  
    "dt": 1733070576,  
    "sunrise": 1733058144,  
    "sunset": 1733065814,  
    "temp": 288.15,  
    "feels_like": 288.15,  
    "humidity": 70,  
    "pressure": 1013.25,  
    "wind_speed": 1.6,  
    "wind_dir": 180,  
    "clouds": 0,  
    "visibility": 10000  
  }  
}
```

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"  
  }  
  }  
}
```

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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"
      }
    ]
  }
}
```

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JSON Practice

JSONObject json =

How would we...

Check for the timezone member?

boolean hasTimezone =

Get the timezone?

String timezone =

```
{
  "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,
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    "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"
      }
    ]
  }
}
```


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JSON Practice

JSONObject json =

How would we...

Obtain the temp value?

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

```
{
  "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,
  }
}
```

Recall that
nested
members
require
multiple steps!

Step 1:

Step 2:

Step 3:

Step 4:

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JSON Practice

JSONObject json =

How would we...

Obtain the temp value?

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

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

}

```
{
  "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,
  }
}
```

Recall that nested members require multiple steps!

Step 1: Check for parent object

Step 2:

Step 3:

Step 4:

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JSON Practice

JSONObject json =

How would we...

Obtain the temp value?

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

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

JSONObject current =

json.getJSONObject("current");

}

```
{
  "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,
  }
}
```

Recall that nested members require multiple steps!

Step 1: Check for parent object

Step 2: Obtain parent object

Step 3:

Step 4:

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JSON Practice

JSONObject json =

How would we...

Obtain the temp value?

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

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

 JSONObject current =

 json.getJSONObject("current");

 if (current.has("temp")) {

 temp = current.getString("temp");

}

```
{
  "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,
  }
}
```

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:

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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"
      }
    ]
  }
}
```

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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());
```

```
{
  "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"
      }
    ]
  }
}
```

Parallel

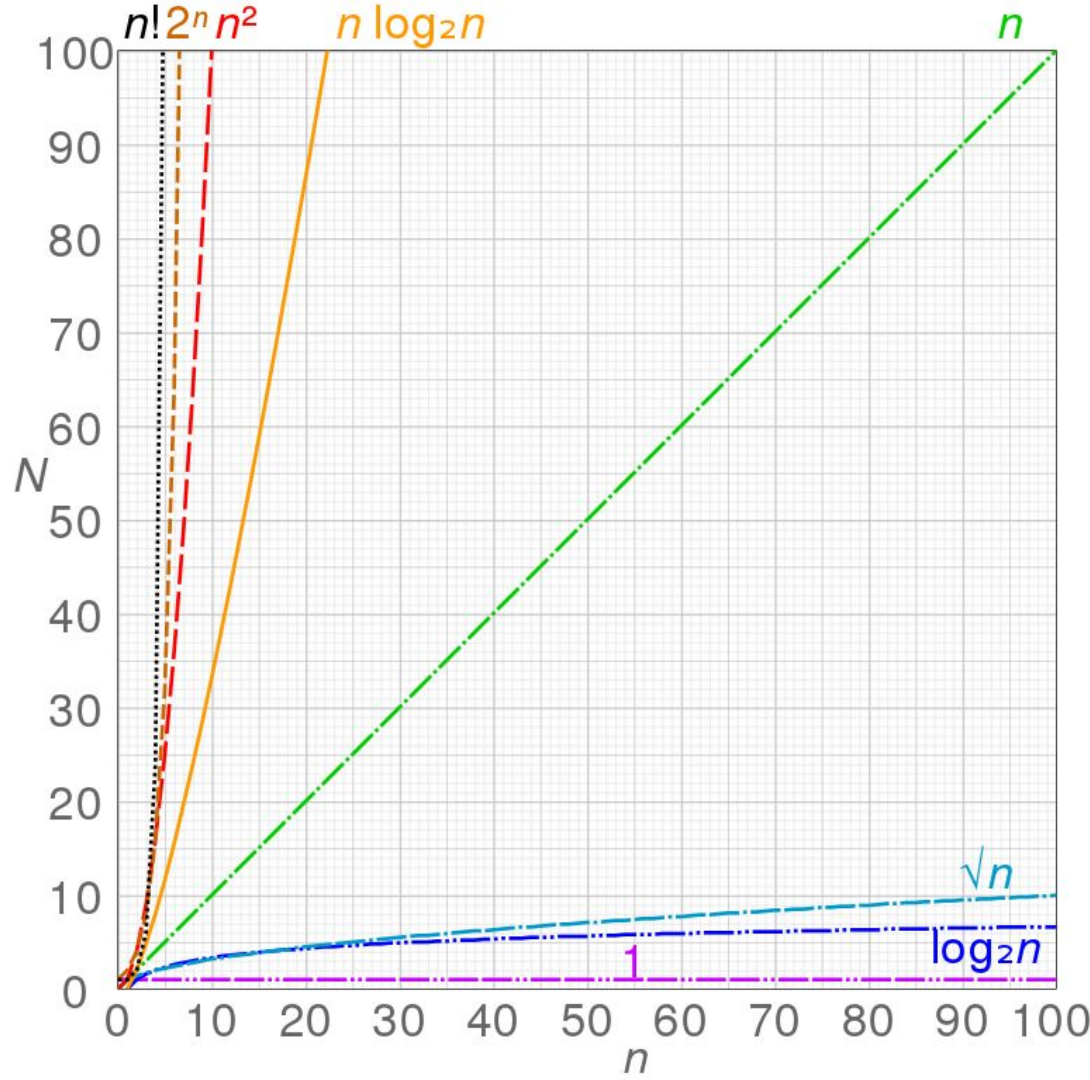
- Single computer
- Work split among different *processors*
- Memory is shared **or** distributed
- Communicate through *bus*
- Latency while waiting for resources

Distributed

- Work is partitioned
- Partitions processed individually
- **Can** improve performance
- **Can** improve speed
- Experience Latency
- Many computers
- Work split among different *locations*
- Memory is distributed
- Communicate through *message passing*
- Total Latency is the sum of the latency between nodes

When to Distribute

When should
we *consider*
distributing?

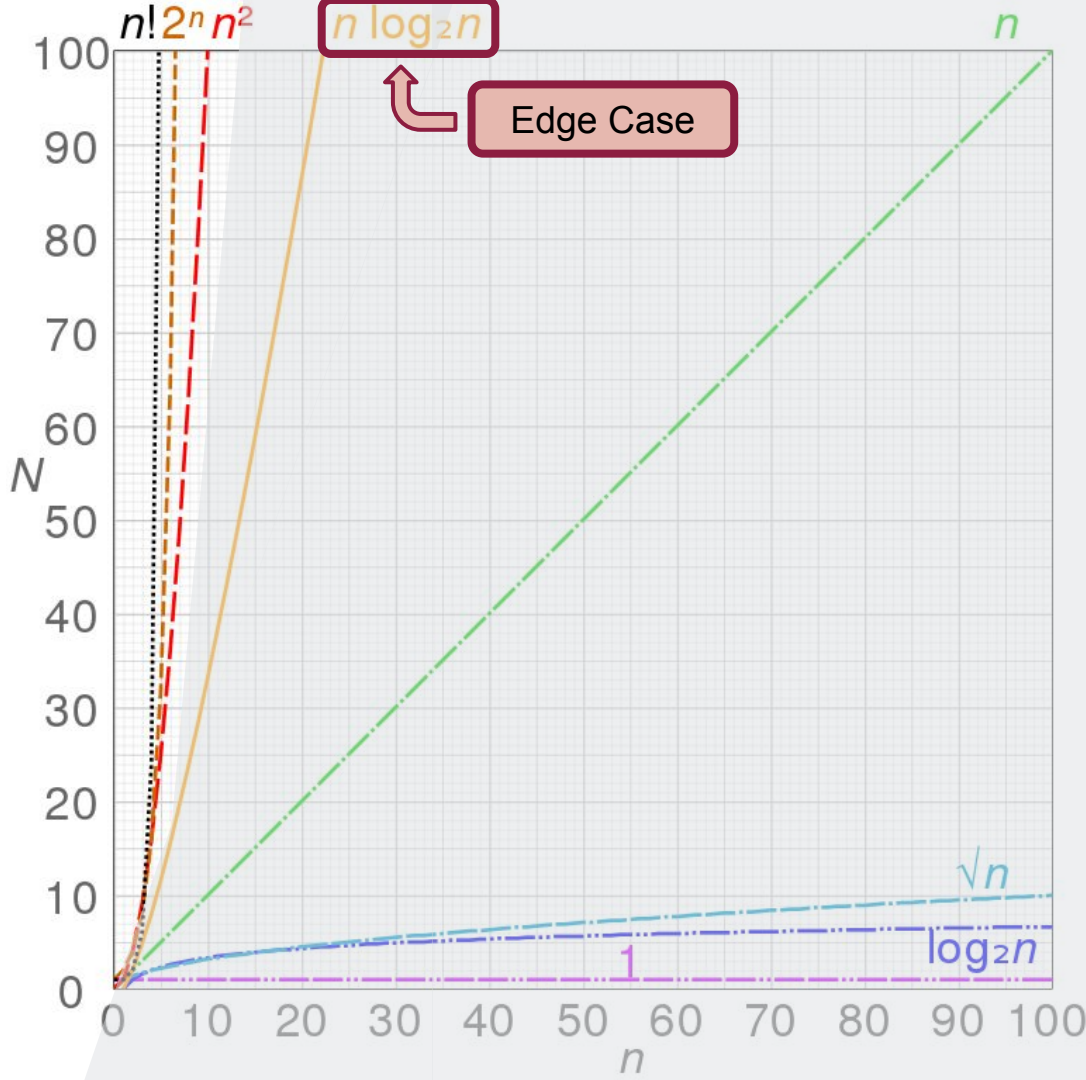


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When to Distribute

When should
we *consider*
distributing?

Super Duper Extra Extra
Large Orders of Magnitude!

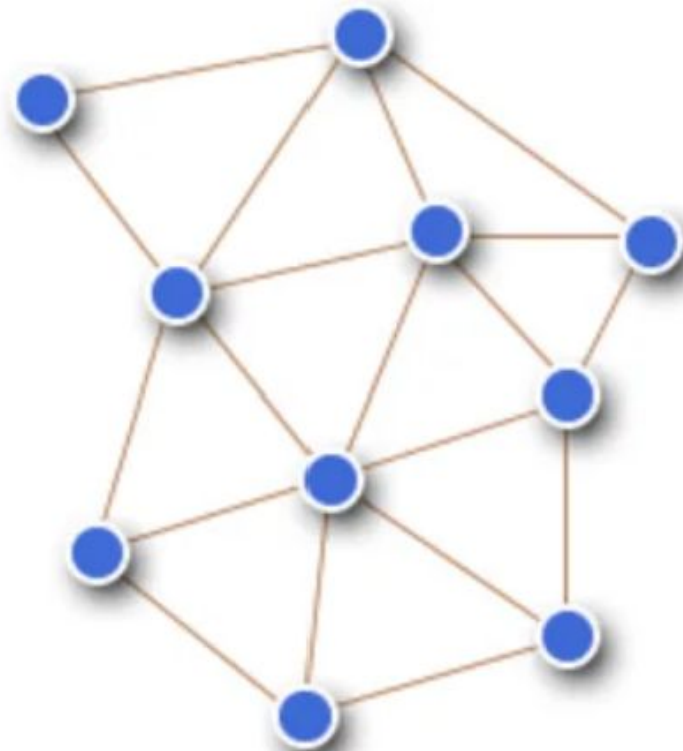


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Distributed Issues

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?

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Consensus

“General agreement or trust amongst a group”

What is Consensus?

Who's in charge or keeping the beat



Leader Election

Check your work with a neighbor



Result Verification

Verify and maintain my copy of the data



Log Replication

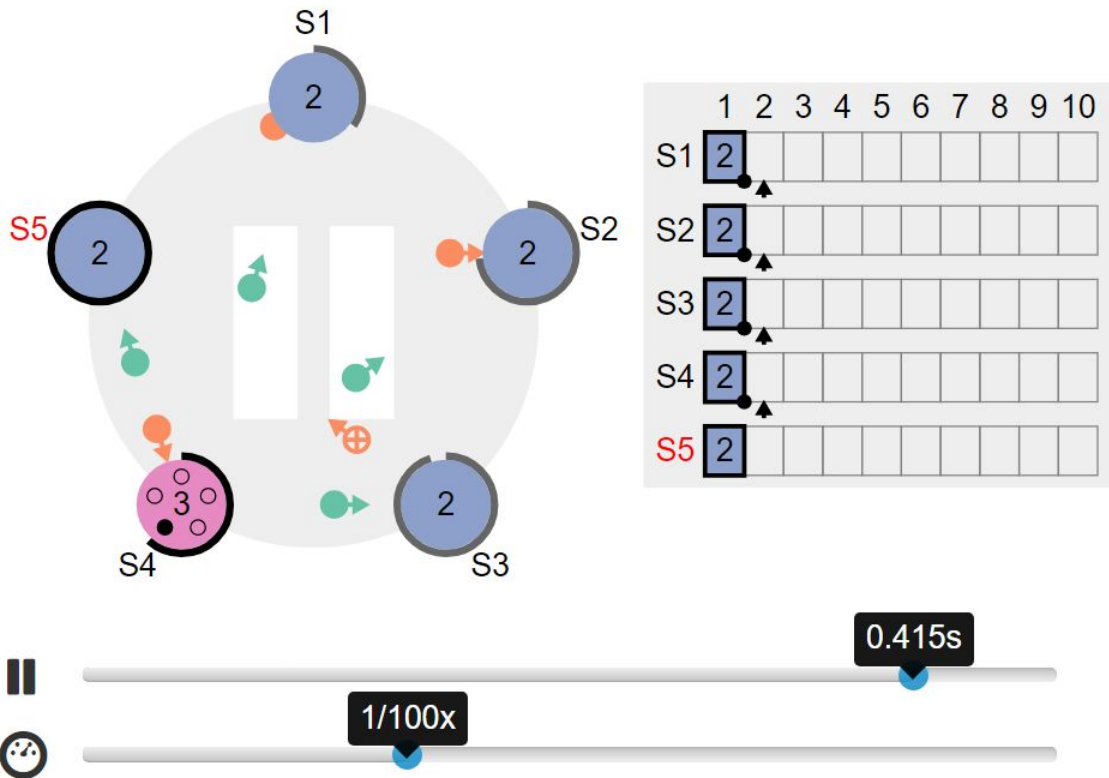
Do I want to let you into my network



Node Validation

RAFT

Do we want to
look at RAFT
again?



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Middleware

We have been:

Serializing
Messages

Sending
Messages

Parsing
Messages

Handle
Messages

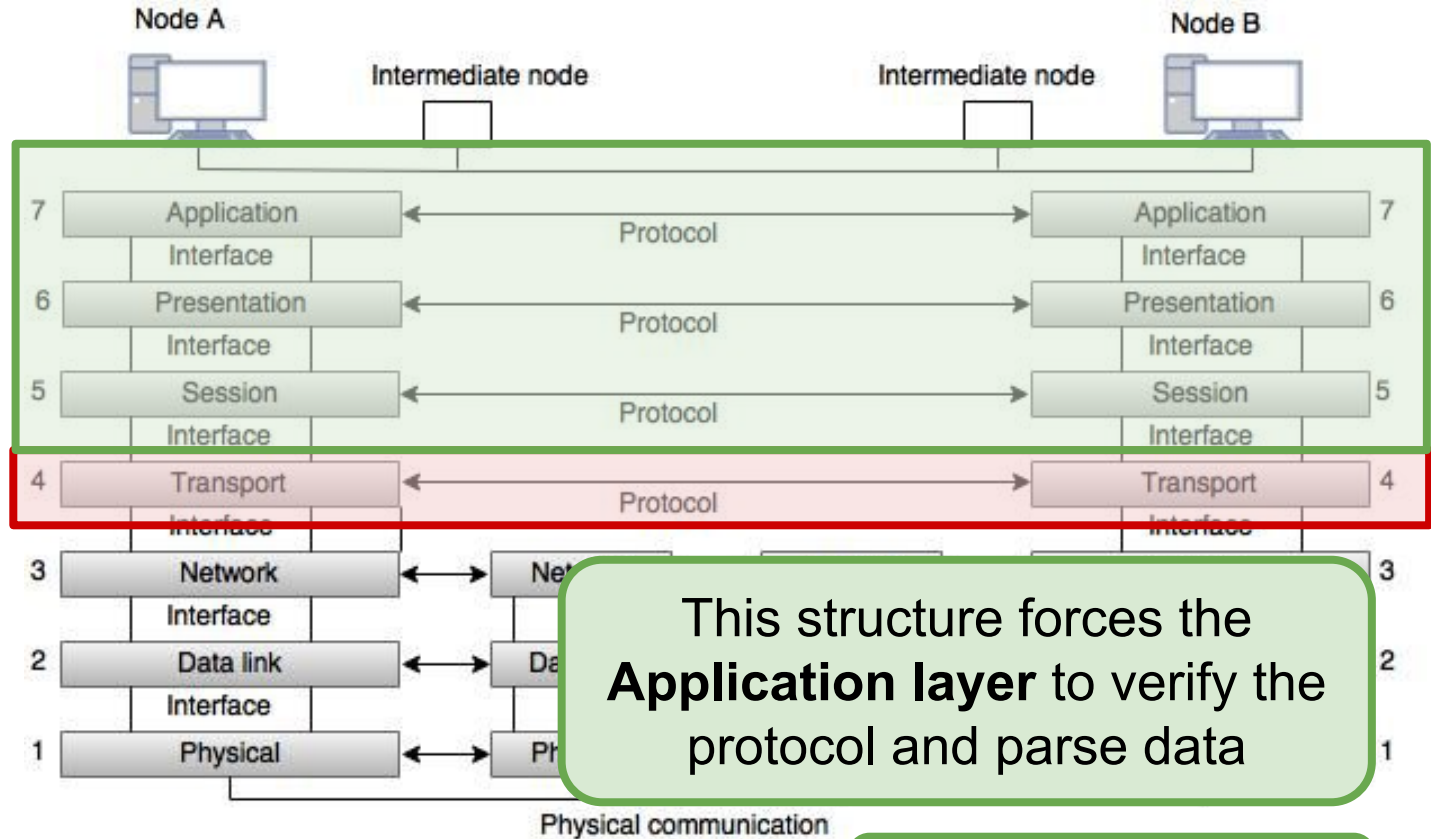


Fig: OSI Model

Not really its job...

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Middleware

With Middleware:

Serializing
Messages

Sending
Messages

Parsing
Messages

Handle
Messages

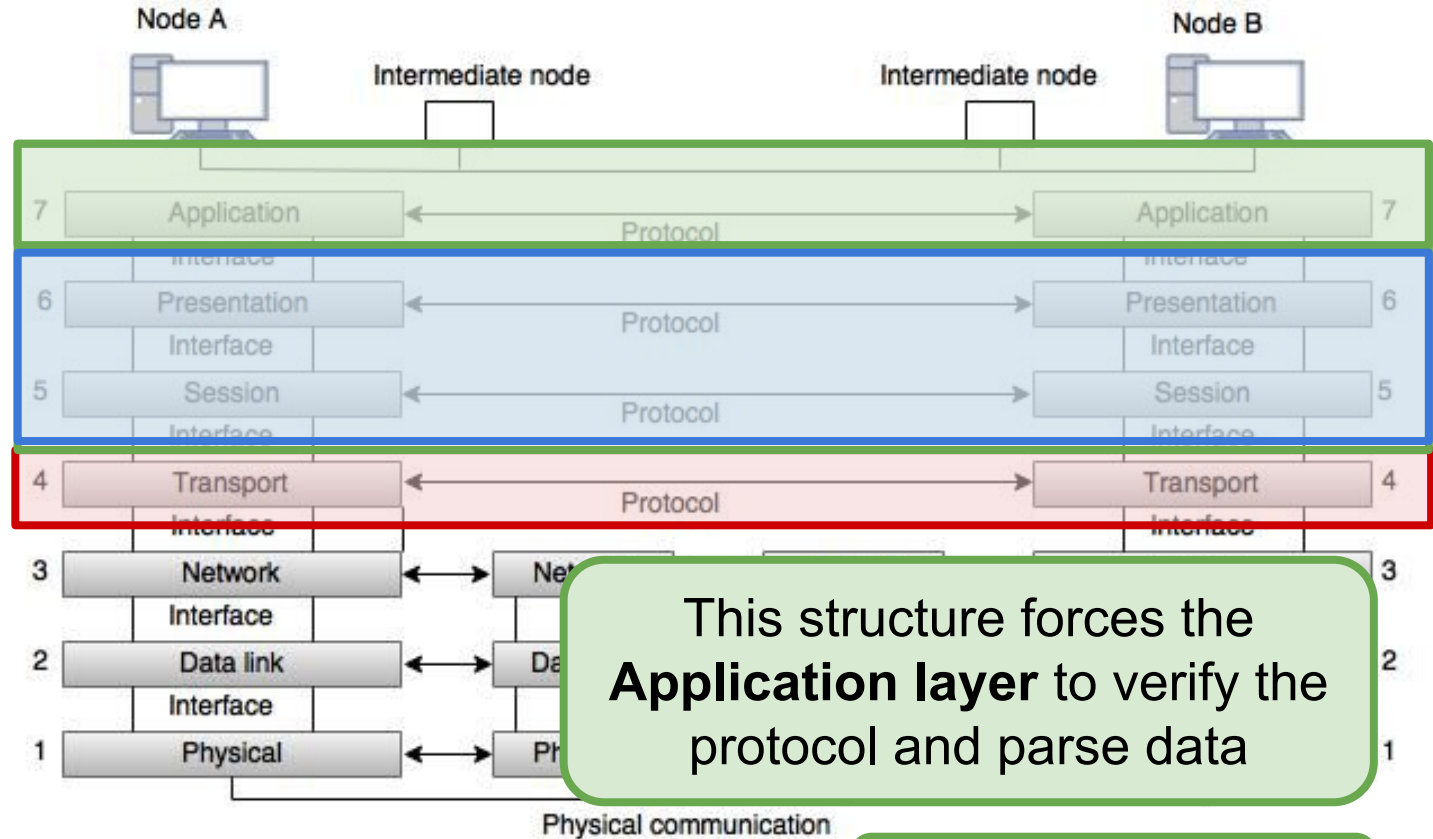


Fig: OSI Model

Not really its job...

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Middleware

With Middleware:

Serializing
Messages

Sending
Messages

Parsing
Messages

Handle
Messages

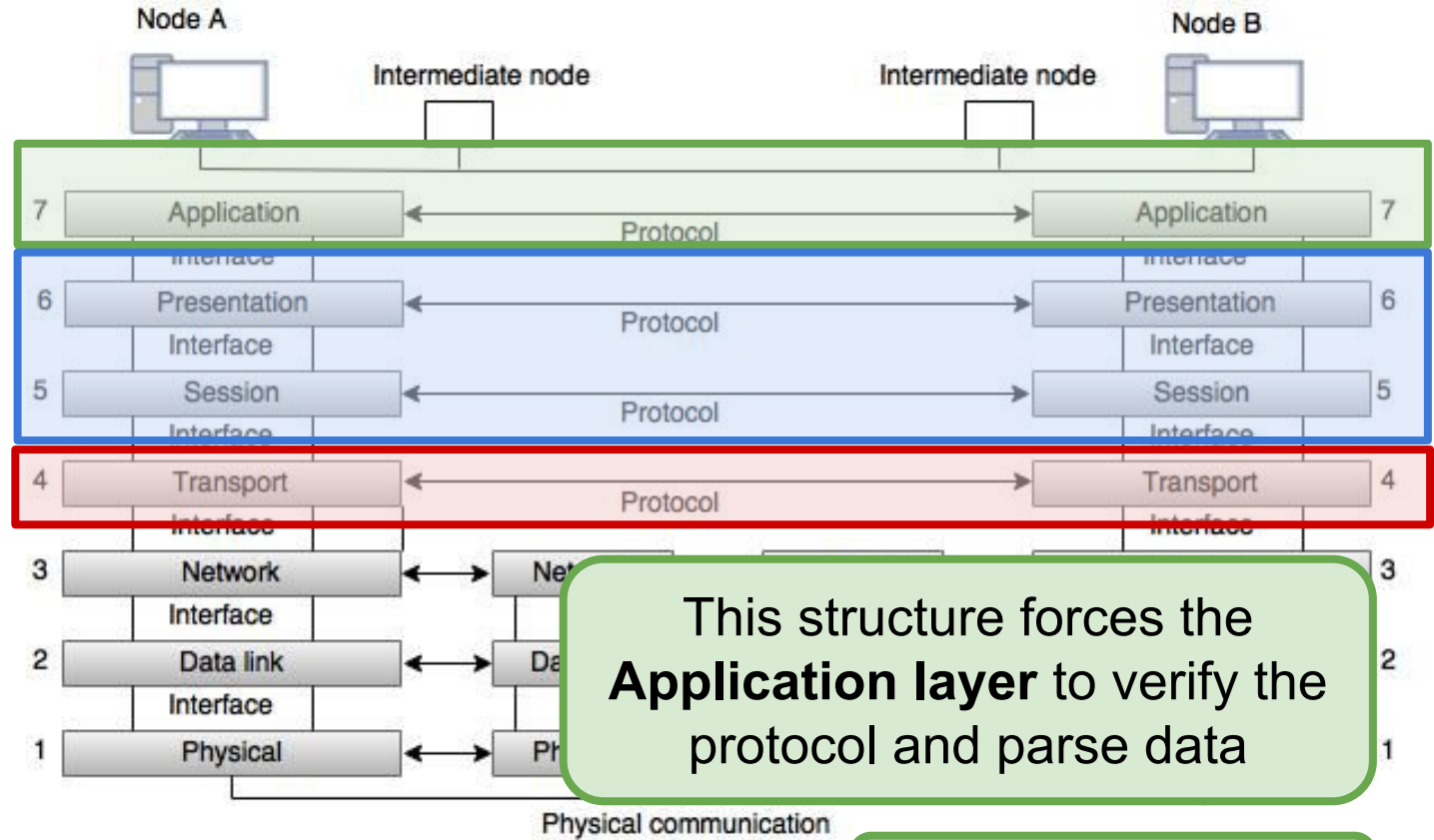


Fig: OSI Model

Not really its job...

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Middleware

Middleware:

Session Layer Responsibilities:

Authentication

Authorization

Session Management

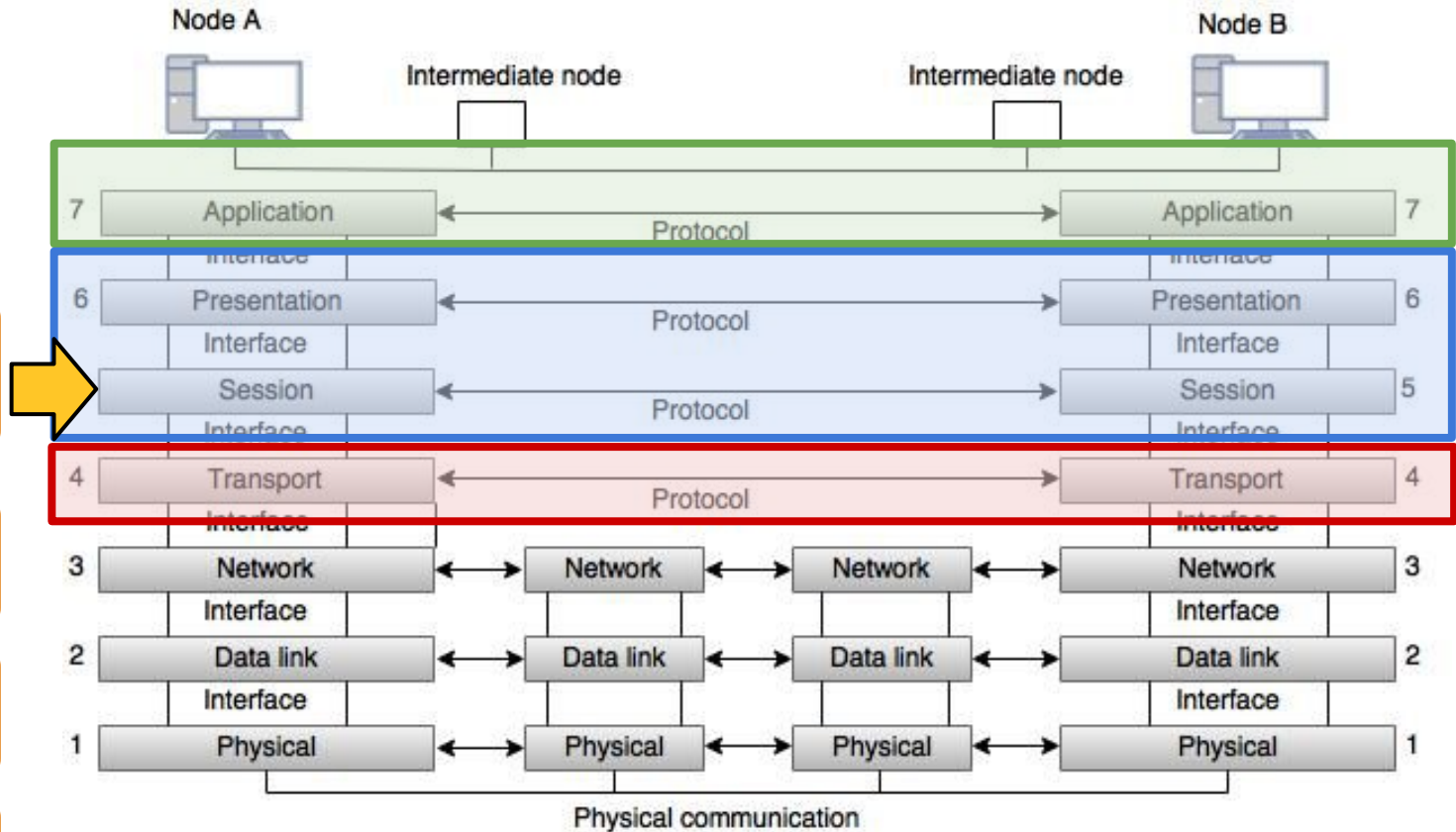


Fig: OSI Model

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Middleware

Middleware:

*Presentation
Layer
Responsibilities:*

Translation

Compression

Encryption

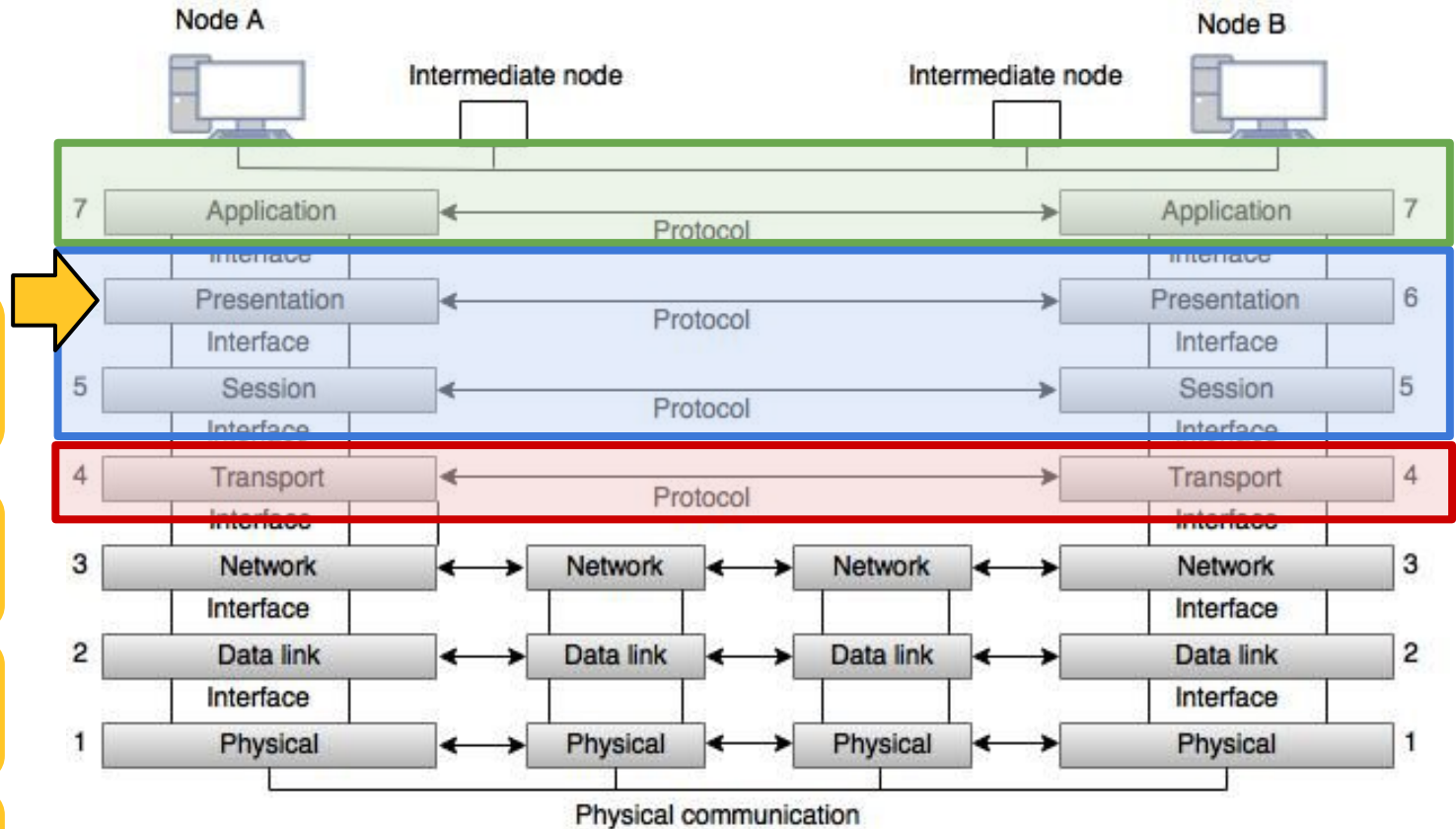


Fig: OSI Model

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Middleware Examples

Examples?

Message Oriented Middleware (MOM)

Web Frameworks

Remote Procedure Calls (RPC)



App. Programming Interface (API)



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Middleware Benefits

Why do we care?

Agility

Reusability

Efficiency

Cost
Effectiveness

Portability

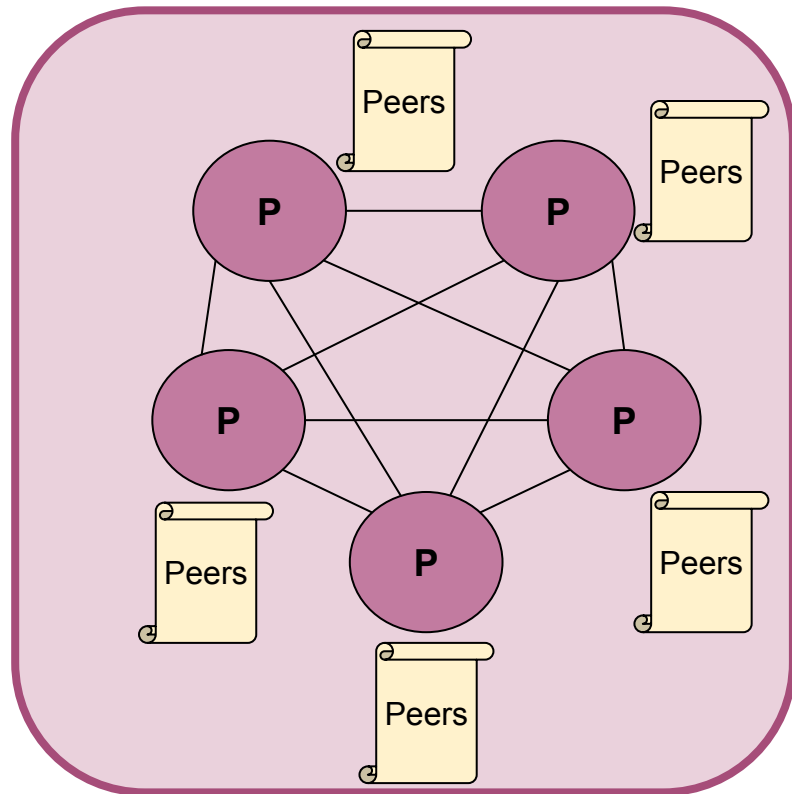
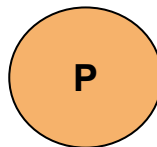
TL;DR →

It's the “glue” between
the client and server

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Communication

What about *adding* a Peer to the Cluster?



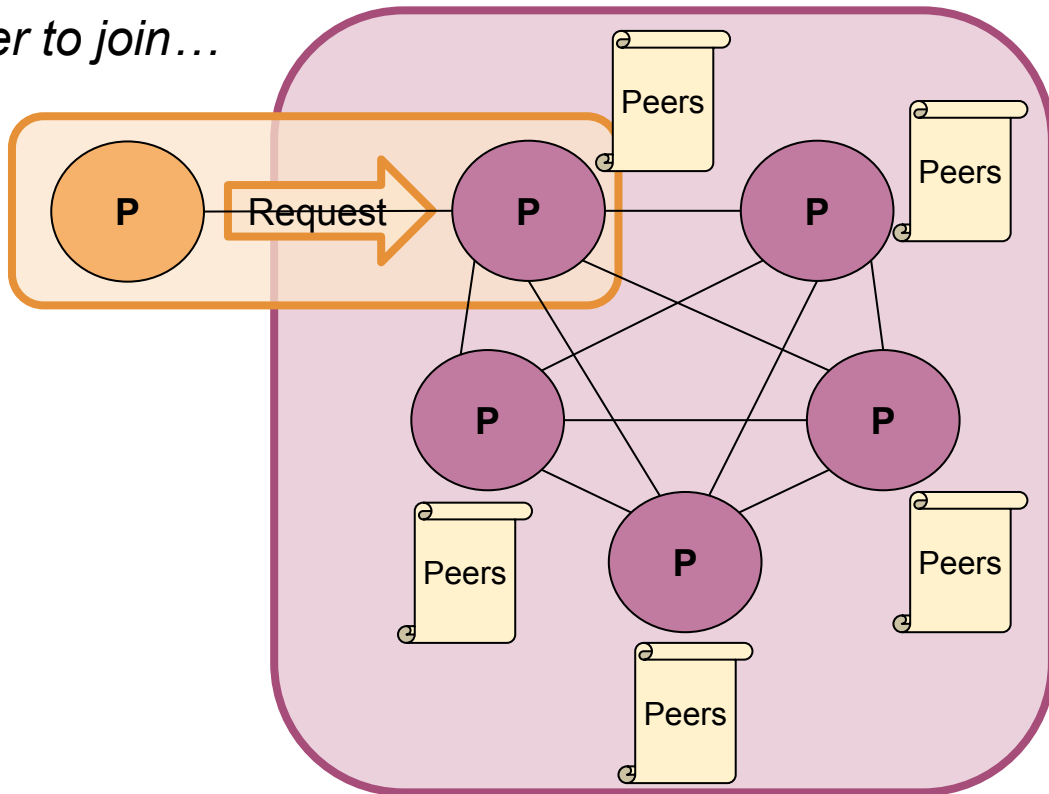
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Communication

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

Assuming we want to allow the peer to join...

Is that all?



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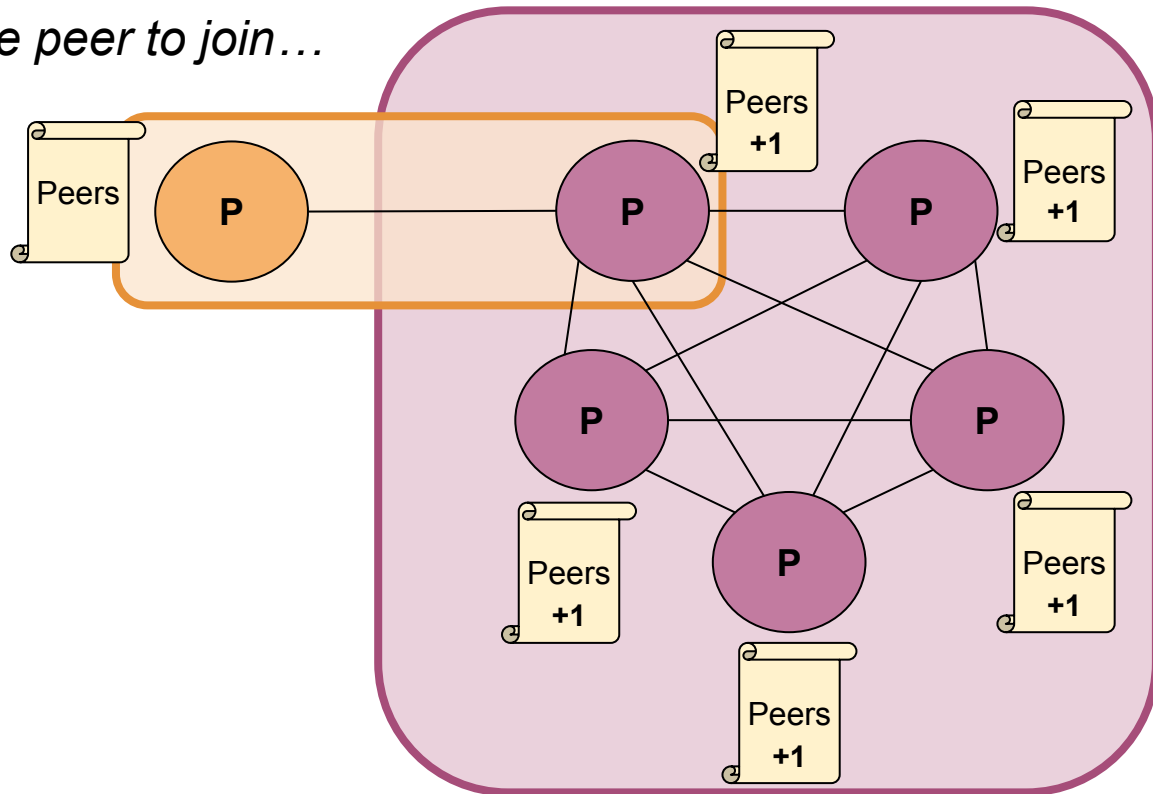
Communication

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

Assuming we want to allow the peer to join...

Three Additional Steps:

- 1.
- 2.
- 3.



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Scratch Space

Questions?

Survey:

<https://asuasn.info/ASNSurvey>



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



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 in-person or online help with math, science, business, or engineering courses? Just hop into our Zoom room or drop into a center for small group tutoring. We'll take it from there.

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[View digital resources](#)

Go to Zoom



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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.

Online Study Hub

1-

Go to Zoom

2-

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[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

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Online Study Hub

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

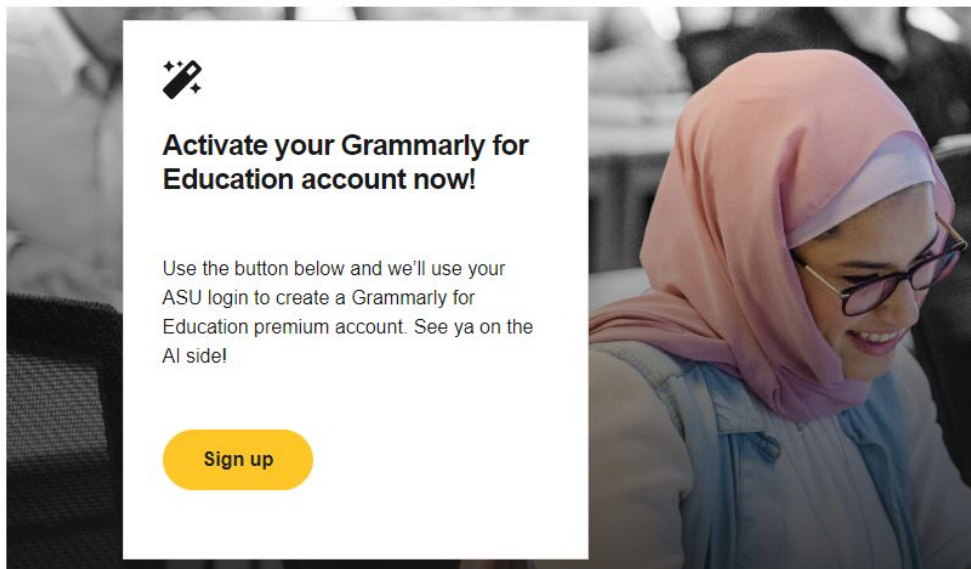
Computer Applications and Information Technology

 [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](#)
- [Austin G Walters Traffic Comparison](#)
- [RAFT](#)