

SER 321 C Session

SI Session

Monday, July 1st 2024

6:00 pm - 7:00 pm MST

Agenda



Middleware

What is it?

Why do we care?

Assignment 6 Structure

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

Middleware

We have been:

Serializing
Messages

Sending
Messages

Parsing
Messages

Handle
Messages

Check out the recording for the discussion!

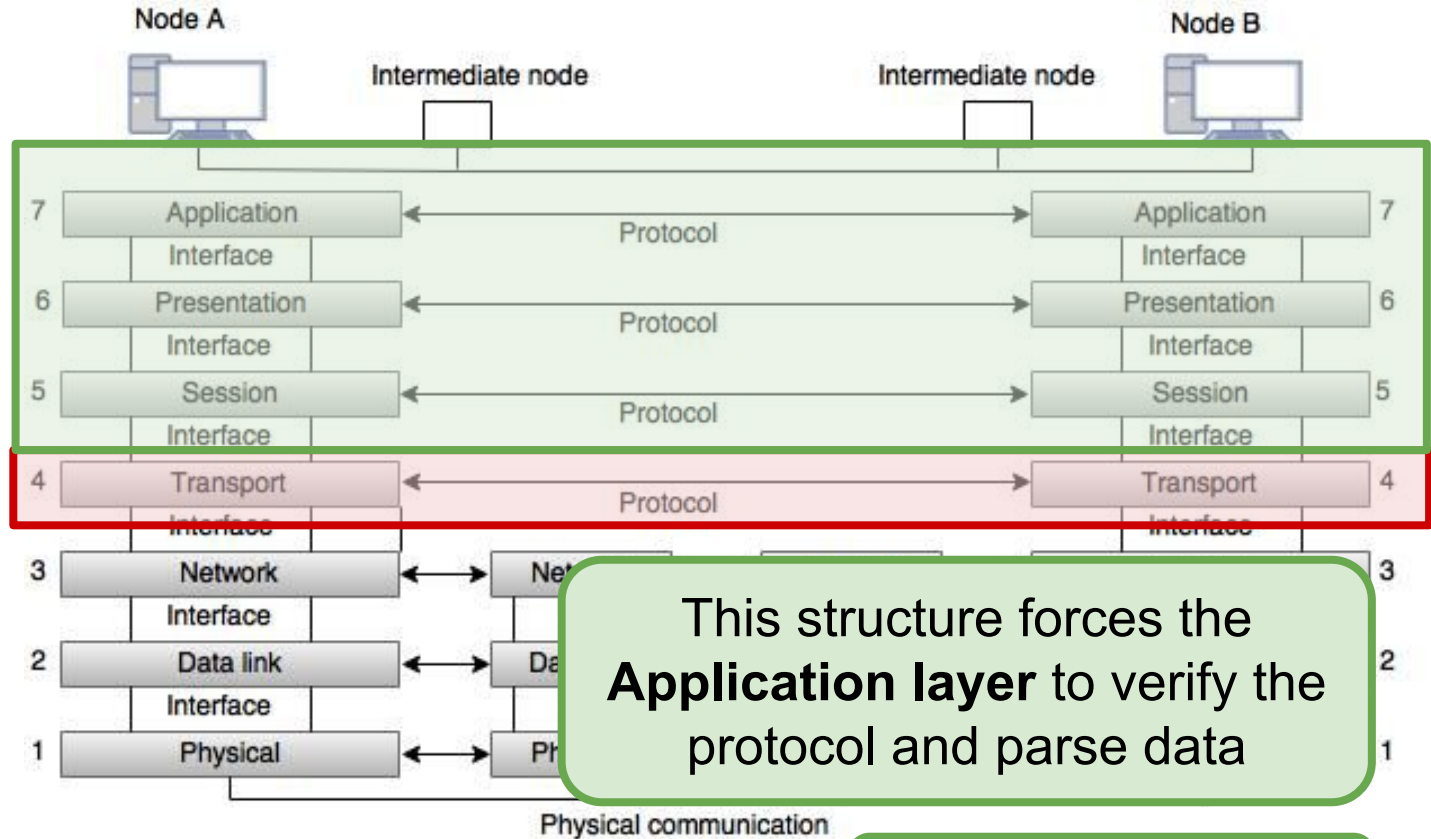


Fig: OSI Model

Not really its job...

Check out the recording for the discussion!

SER 321

Middleware

With Middleware:

Serializing
Messages

Sending
Messages

Parsing
Messages

Handle
Messages

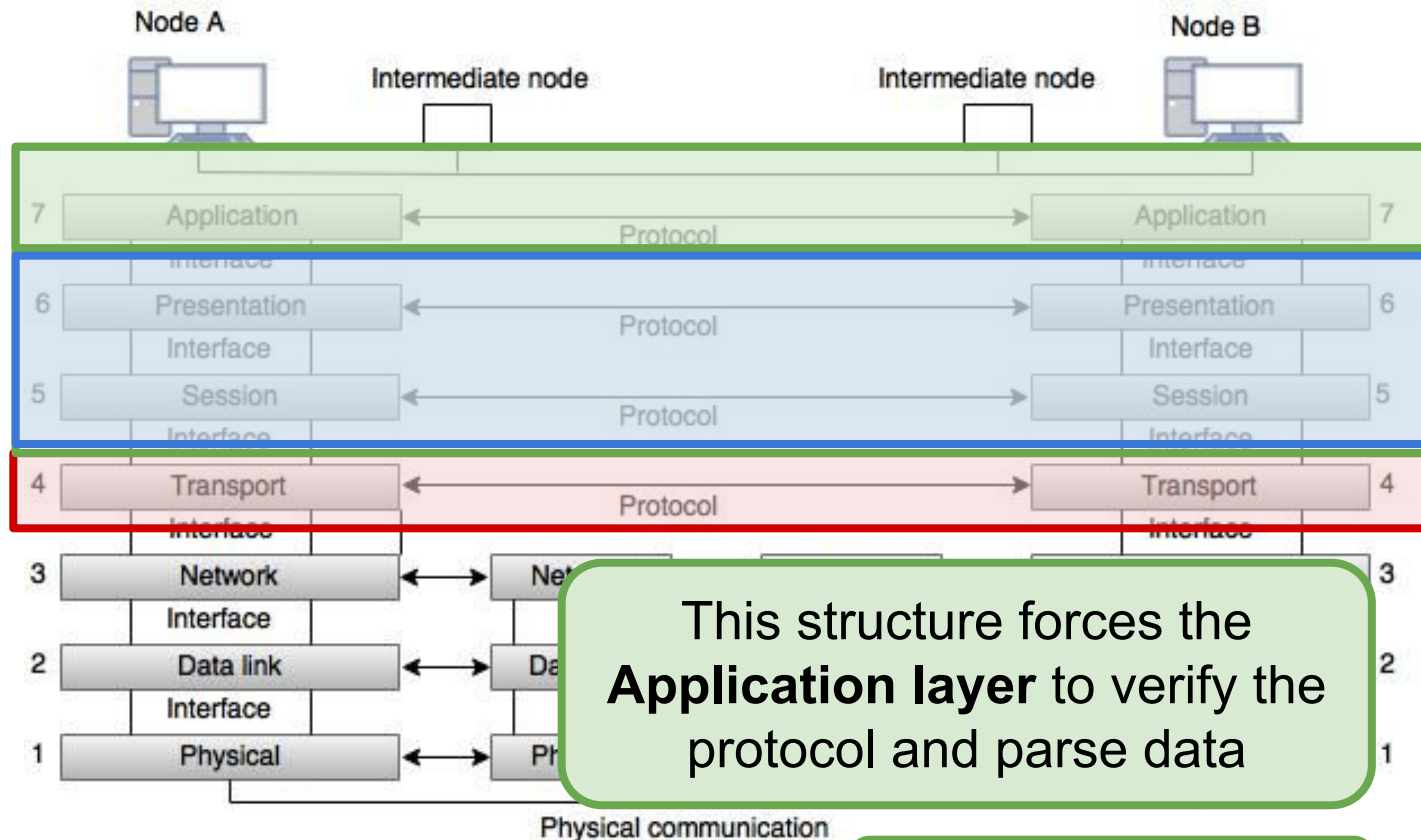


Fig: OSI Model

Not really its job...

SER 321

Middleware

With Middleware:

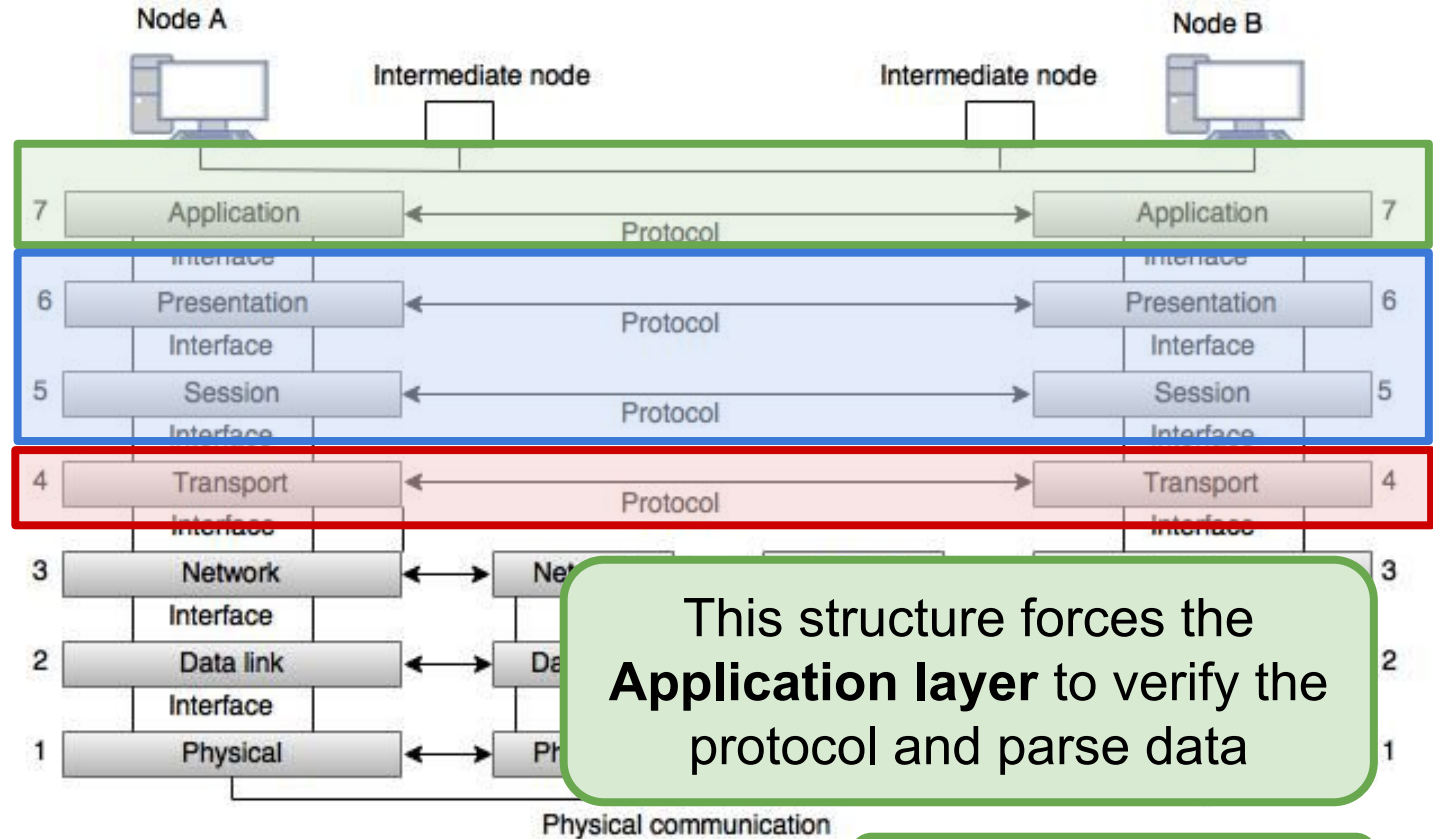
Serializing
Messages

Sending
Messages

Parsing
Messages

Handle
Messages

Check out the recording for the discussion!



Check out the recording for the discussion!

SER 321 Middleware

Middleware:

*Session Layer
Responsibilities:*

Authentication

Authorization

Session
Management

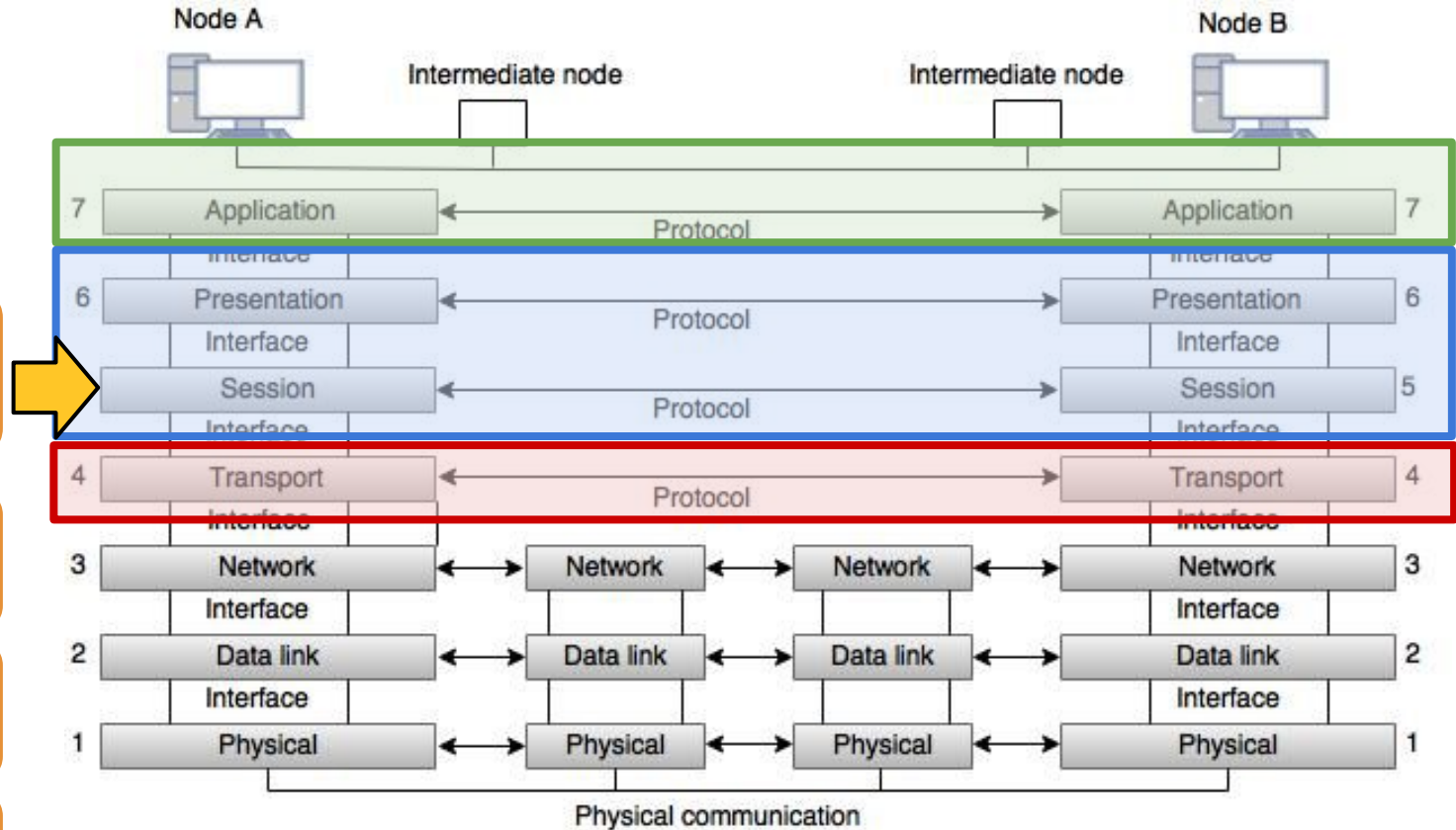


Fig: OSI Model

Check out the recording for the discussion!

SER 321 Middleware

Middleware:

*Presentation
Layer
Responsibilities:*

Translation

Compression

Encryption

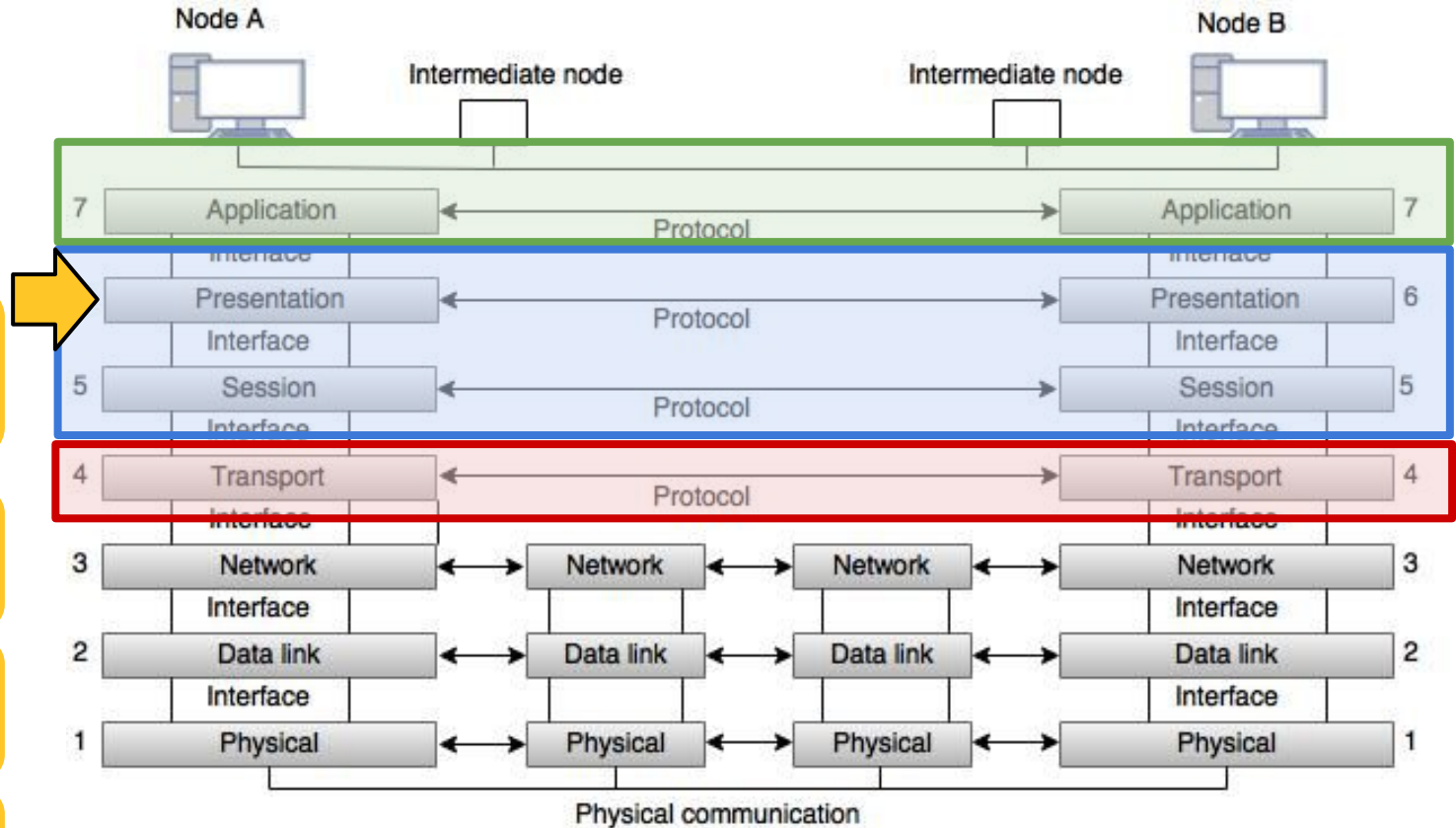


Fig: OSI Model

SER 321

Middleware

Examples?

Check out the recording for the discussion!

Message Oriented Middleware (MOM)

Web Frameworks

Remote Procedure Calls (RPC)



App. Programming Interface (API)



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Middleware

Why do we care?

Agility

Reusability

Efficiency

Cost
Effectiveness

Portability

Check out the recording for the discussion!

Why do we care?



Sort of like publishing a contract

“If you follow these rules, I will
handle your request.”

Check out the recording for the discussion!

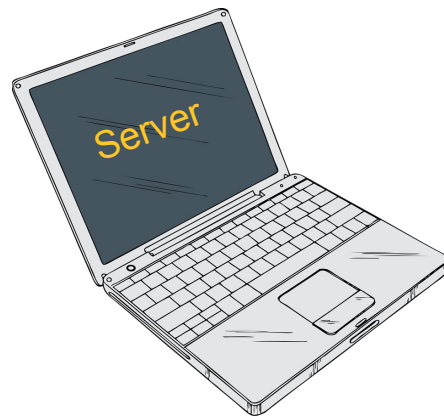
SER 321

Middleware

Add User:
Name = Katie
Password = password

With Middleware:

Check out the recording for the discussion!



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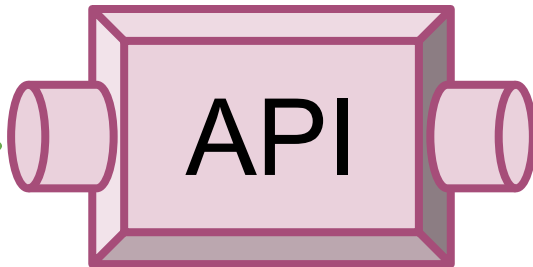
Middleware

Add User:
Name = Katie
Password = password

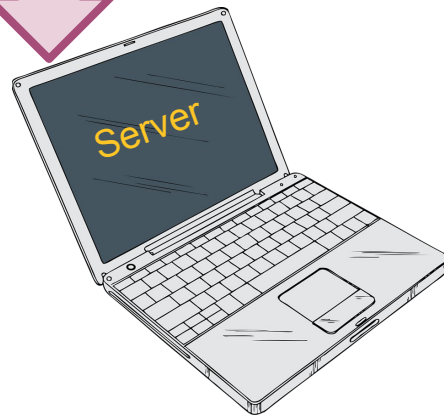
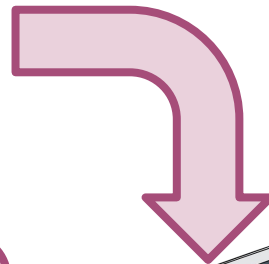


With Middleware:

Check out the recording for the discussion!



```
{  
  "type": "addUser",  
  "name": "katie",  
  "password": "password"  
}
```



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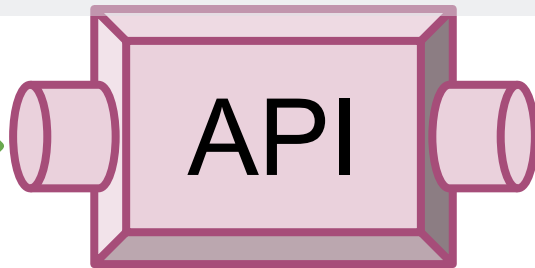
Middleware

Get repositories for a
specific user



With Middleware:

Check out the recording for the discussion!



GitHub REST API

Code samples for "List repositories for a user"

Request example

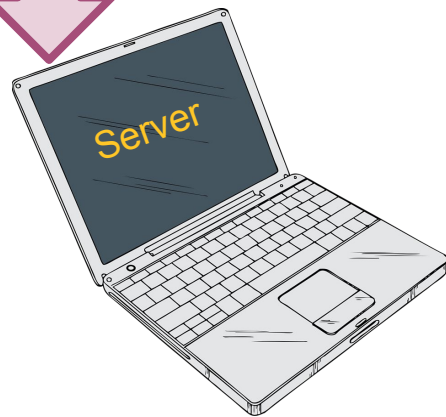
GET /users/{username}/repos

cURL

JavaScript

GitHub CLI

```
curl -L \  
-H "Accept: application/vnd.github+json" \  
-H "Authorization: Bearer <YOUR-TOKEN>" \  
-H "X-GitHub-API-Version: 2022-11-28" \  
https://api.github.com/users/USERNAME/repos
```



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Middleware

Get repositories for a specific user

With Middleware:

Check out the recording for the discussion!

GitHub REST API

API

Code samples for "List repositories"

Request example

GET /users/{username}/repos

cURL JavaScript GitHub CLI

```
curl -L \
-H "Accept: application/vnd.github+json" \
-H "Authorization: Bearer <YOUR_TOKEN>" \
-H "X-GitHub-Api-Version: 2022-11-01" \
https://api.github.com/users/U
```

```
{
  "id": 550568457,
  "node_id": "R_kgDOIIECCQ",
  "name": "assign1git",
  "full_name": "kgrinne3/assign1git",
  "private": false,
  "owner": {
    "login": "kgrinne3",
    "id": 115493885,
    "node_id": "U_kgDOBuJL_Q",
    "avatar_url": "https://avatars.githubusercontent.com/u/115493885?v=4",
    "gravatar_id": "",
    "url": "https://api.github.com/users/kgrinne3",
    "html_url": "https://github.com/kgrinne3",
    "followers_url": "https://api.github.com/users/kgrinne3/followers",
    "following_url": "https://api.github.com/users/kgrinne3/following{/other_user}",
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    "organizations_url": "https://api.github.com/users/kgrinne3/orgs",
    "repos_url": "https://api.github.com/users/kgrinne3/repos",
    "events_url": "https://api.github.com/users/kgrinne3/events{/privacy}",
    "received_events_url": "https://api.github.com/users/kgrinne3/received_events",
    "type": "User",
    "site_admin": false
  },
  "html_url": "https://github.com/kgrinne3/assign1git",
  "description": "Katie Grinnell",
  "fork": false,
  "url": "https://api.github.com/repos/kgrinne3/assign1git",
  "forks_url": "https://api.github.com/repos/kgrinne3/assign1git/forks",
  "keys_url": "https://api.github.com/repos/kgrinne3/assign1git/keys{/key_id}",
  "collaborators_url": "https://api.github.com/repos/kgrinne3/assign1git/collaborators{/collaborator}",
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  "blobs_url": "https://api.github.com/repos/kgrinne3/assign1git/git/blobs{/sha}",
  "git_tags_url": "https://api.github.com/repos/kgrinne3/assign1git/git/tags{/sha}",
  "git_refs_url": "https://api.github.com/repos/kgrinne3/assign1git/git/refs{/sha}"
}
```



<https://api.github.com/users/kgrinne3/repos>

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Assign 6

Check out the recording for the discussion!



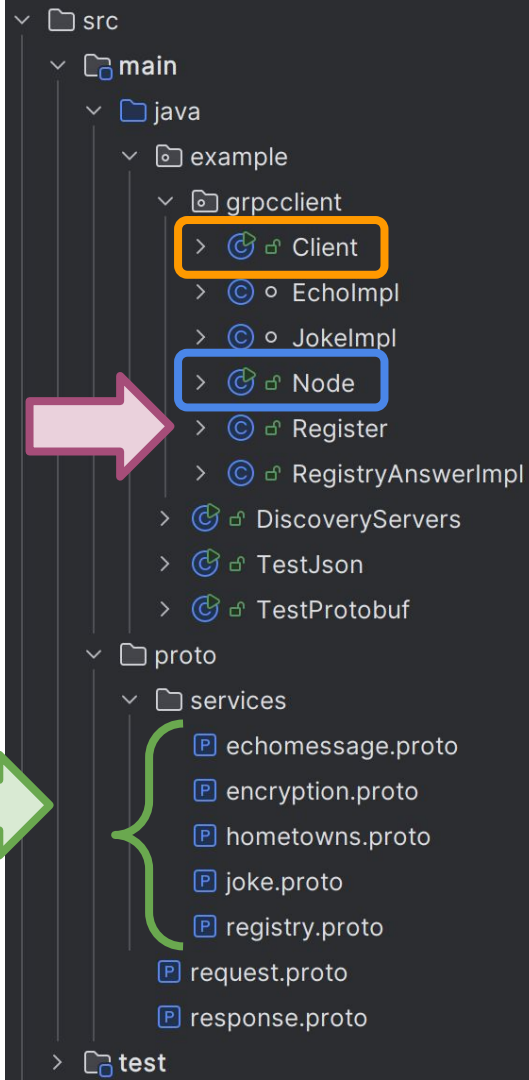
Protocol Buffers!

Client

Node

Registry

Service



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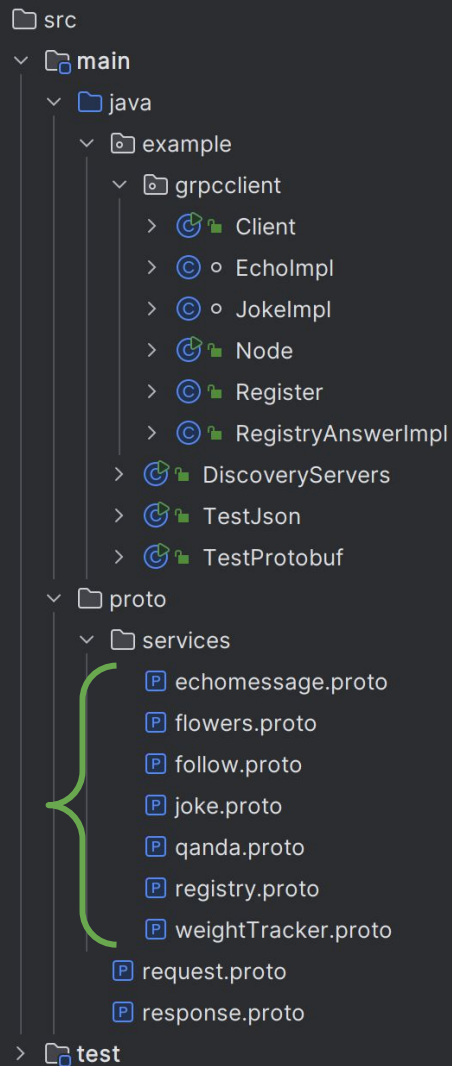
Protobuf Review

Check out the recording for the discussion!

All nodes and clients have agreed to these contracts

So ***DON'T CHANGE THEM!***

Think of these as a *contract*



Check out the recording for the discussion!

SER 321

Protobuf Review

joke.proto

```
// We are reading how many jokes the clients wants and put them in a list to send back to client
@Override 1 usage
public void getJoke(JokeReq req, StreamObserver<JokeRes> responseObserver) {
    System.out.println("Received from client: " + req.getNumber());
    JokeRes.Builder response = JokeRes.newBuilder();
    for (int i=0; i < req.getNumber(); i++){
        if(!jokes.empty()) {
            // yes, I take the joke out when it was used already,
            // should probably be done differently since this way
            // a joke cannot be told twice even to different clients
            response.addJoke(jokes.pop());
        }
        else {
            // this is more of a hack, better would be to either
            // check the number at the beginning and say right away
            // if you do not have enough. Or send an error code or
            // similar as well.
            response.addJoke(value: "I am out of jokes...");
            break;
        }
    }
    JokeRes resp = response.build();
    responseObserver.onNext(resp);
    responseObserver.onCompleted();
}
```

```
// We take the joke the user wants to set and put it in our set of jokes
@Override 1 usage
public void setJoke(JokeSetReq req, StreamObserver<JokeSetRes> responseObserver) {

    System.out.println("Received from client: " + req.getJoke());
    JokeSetRes.Builder response = JokeSetRes.newBuilder();
    if (req.getJoke().isEmpty()) { // we do not want to add empty jokes
        response.setOk(false);
    } else {
        jokes.add(req.getJoke());
        response.setOk(true);
    }

    JokeSetRes resp = response.build();
    responseObserver.onNext(resp);
    responseObserver.onCompleted();
}
```

```
syntax = "proto3";

option java_multiple_files = true;
option java_package = "service";
option java_outer_classname = "JokeProto";

package services;

service Joke {
    rpc getJoke (JokeReq) returns (JokeRes) {}
    rpc setJoke (JokeSetReq) returns (JokeSetRes) {}
}

// The request message
message JokeReq {
    int32 number = 1;
```

Check out the recording for the discussion!

SER 321

Protobuf Review

Use a **Builder** to construct the proto object

Fill with *setters*

Build when done!

joke.proto

How do we use Protobufs again?

```
syntax = "proto3";

option java_multiple_files = true;
option java_package = "service";
option java_outer_classname = "JokeProto";

package services;

service Joke {
  rpc getJoke (JokeReq) returns (JokeRes) {}
  rpc setJoke (JokeSetReq) returns (JokeSetRes) {}
}

// The request message
message JokeReq {
  int32 number = 1;
```

```
// We take the joke the user wants to set and put it in our set of jokes
@Override 1usage
public void setJoke(JokeSetReq req, StreamObserver<JokeSetRes> responseObserver) {

    System.out.println("Received from client: " + req.getJoke());
    JokeSetRes.Builder response = JokeSetRes.newBuilder();
    if (req.getJoke().isEmpty()) { // we do not want to add empty jokes
        response.setOk(false);
    } else {
        jokes.add(req.getJoke());
        response.setOk(true);
    }

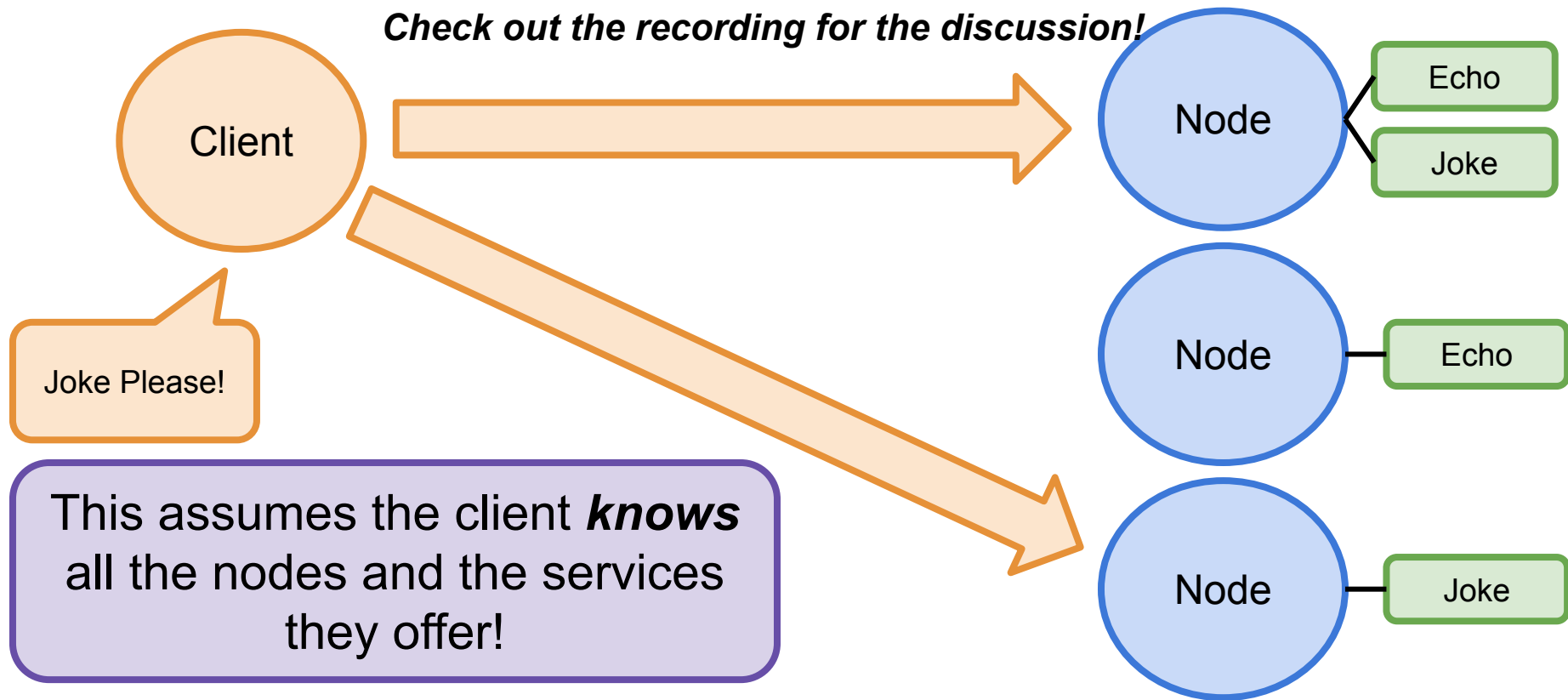
    JokeSetRes resp = response.build();
    responseObserver.onNext(resp);
    responseObserver.onCompleted();
}
```

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Assign 6

Previously...

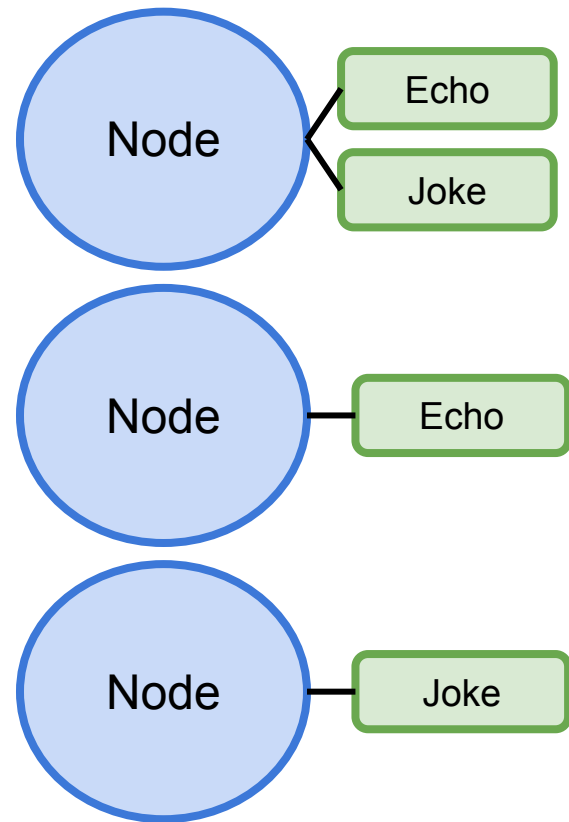
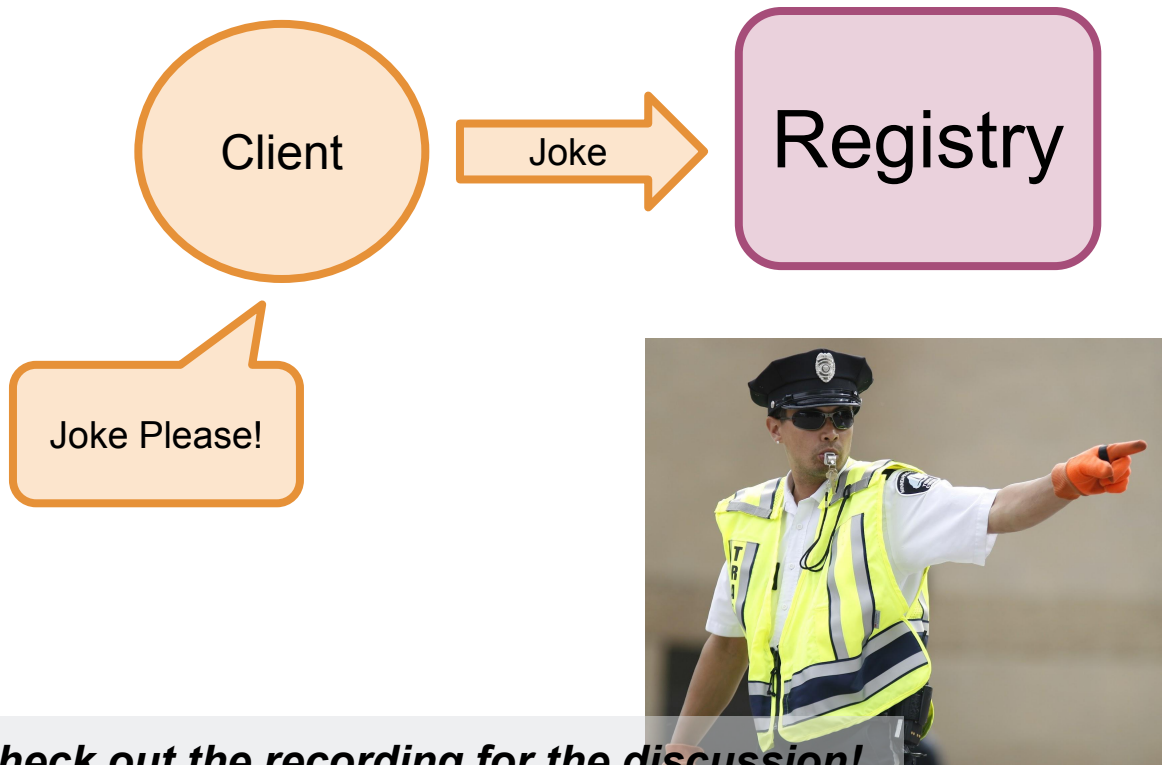
Check out the recording for the discussion!



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Assign 6

With GRPC...

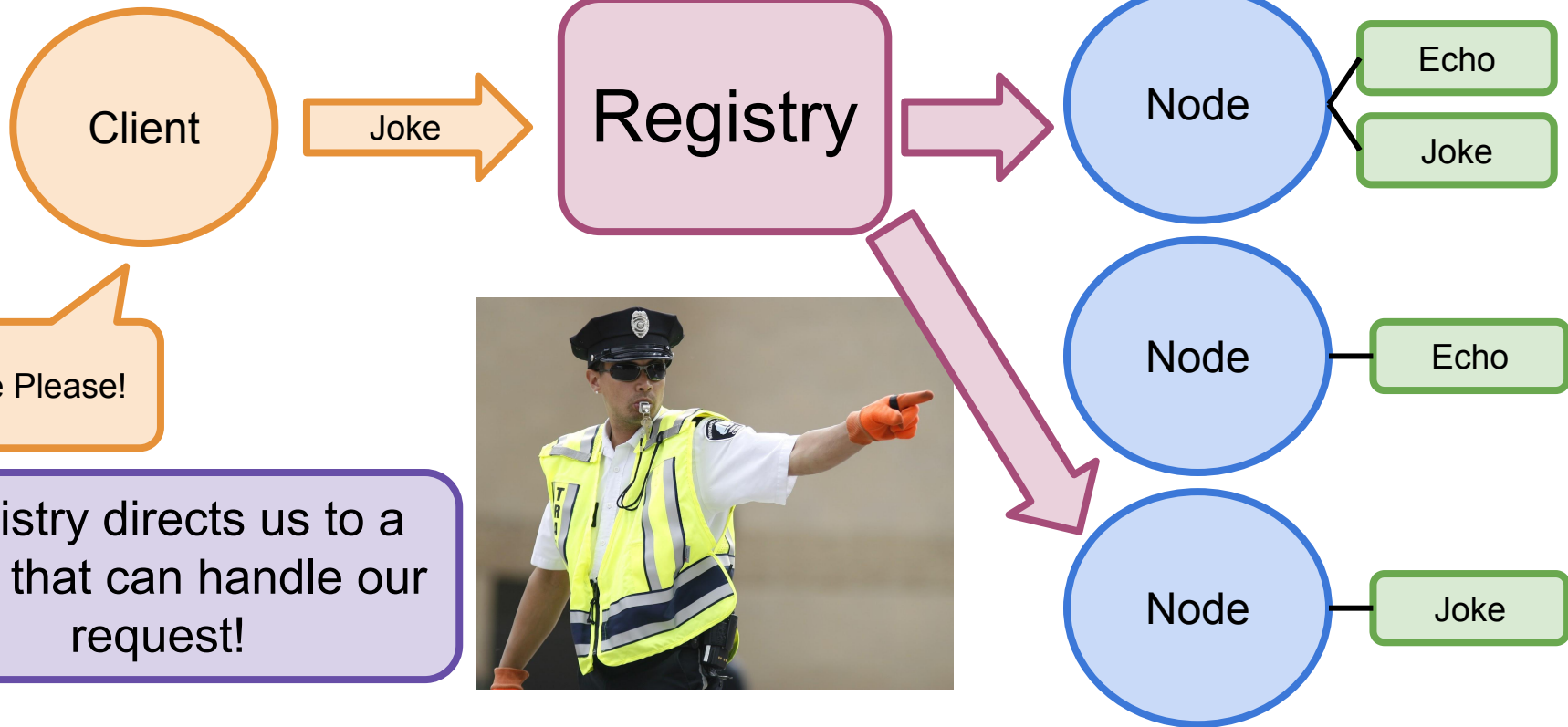


Check out the recording for the discussion!

SER 321

Assign 6

With GRPC...



SER 321

Assign 6

Okay so how do we actually *use* this setup?

```
public void setJoke(String joke) {
    JokeSetReq request = JokeSetReq.newBuilder()
        .setJoke(joke).build();
    JokeSetRes response;

    try {
        response = blockingStub2.setJoke(request);
        System.out.println(response.getOk());
    } catch (Exception e) {
        System.err.println("RPC failed: " + e);
        return;
    }
}
```

Client.java

```
Client client = new Client(channel, regChannel);
```

```
// call the parrot service on the server
client.askServerToParrot(message);
```

```
// ask the user for input how many jokes the user wants
BufferedReader reader = new BufferedReader(new InputStreamReader(System.in));
```

```
// Reading data using readLine
System.out.println("How many jokes would you like?"); // NO ERROR handling of wrong input here.
String num = reader.readLine();
```

```
// calling the joked service from the server with num from user input
client.askForJokes(Integer.valueOf(num));
```

```
// adding a joke to the server
client.setJoke("I made a pencil with two erasers. It was pointless.");
```

```
// showing 6 joked
client.askForJokes(Integer.valueOf(6));
```

```
@Override
public void setJoke(JokeSetReq req, StreamObserver<JokeSetRes> responseObserver) {

    System.out.println("Received from client: " + req.getJoke());
    JokeSetRes.Builder response = JokeSetRes.newBuilder();
    if (req.getJoke().isEmpty()) { // we do not want to add empty jokes
        response.setOk(false);
    } else {
        jokes.add(req.getJoke());
        response.setOk(true);
    }

    JokeSetRes resp = response.build();
    responseObserver.onNext(resp);
    responseObserver.onCompleted();
}
```

Client.java (Main)

JokeImpl.java

Looking at SetJoke

Check out the recording for the discussion!

SER 321

Assign 6

Okay so how do we actually *use* this setup?

```
public void setJoke(String joke) {  
    JokeSetReq request = JokeSetReq.newBuilder()  
        .setJoke(joke).build();  
    JokeSetRes response;  
  
    try {  
        response = blockingStub2.setJoke(request);  
        System.out.println(response.getOk());  
    } catch (Exception e) {  
        System.err.println("RPC failed: " + e);  
        return;  
    }  
}
```

Client.java

Client provides the info

Client creates request

Everything else we have had to do is handled in the Implementation Class!

```
Client client = new Client(channel, regChannel);
```

```
// Implement the joke service. It has two services getJokes and setJoke  
class JokeImpl extends JokeGrpc.JokeImplBase { 1 usage
```

JokeImpl.java

```
// having a global set of jokes  
Stack<String> jokes = new Stack<>(); 7 usages
```

```
public JokeImpl(){ 1 usage  
    super();  
    // copying some dad jokes  
    jokes.add("How do you get a squirrel to like you? Act like a nut.");  
    jokes.add("I don't trust stairs. They're always up to something.");  
    jokes.add("What do you call someone with no body and no nose? Nobody knows.");  
    jokes.add("Did you hear the rumor about butter? Well, I'm not going to spread it!");  
}
```

```
// When the client asks for jokes  
@Override  
client.askForJokes(Integer.valueOf(6));
```

```
public void setJoke(JokeSetReq req, StreamObserver<JokeSetRes> responseObserver) {  
  
    System.out.println("Received from client: " + req.getJoke());  
    JokeSetRes.Builder response = JokeSetRes.newBuilder();  
    if (req.getJoke().isEmpty()) { // we do not want to add empty jokes  
        response.setOk(false);  
    } else {  
        jokes.add(req.getJoke());  
        response.setOk(true);  
    }  
  
    JokeSetRes resp = response.build();  
    responseObserver.onNext(resp);  
    responseObserver.onCompleted();  
}
```

JokeImpl.java

SER 321

Scratch Space

What does that imply
for the system?

```
public void setJoke(String joke) {  
    JokeSetReq request = JokeSetReq.newBuilder()  
        .setJoke(joke).build();  
    JokeSetRes response;
```

Client.java

```
try {  
    response = blockingStub2.setJoke(request);  
    System.out.println("Joke set successfully");  
} catch (Exception e) {  
    System.out.println("Error setting joke: " + e.getMessage());  
}
```

Client Class acts like a
middleman!

*Everything else we have
had to do is handled in the
Implementation Class!*

```
Client client = new Client(channel, regChannel);
```

```
// call the parrot service on the server  
client.askServerToParrot(message);
```

```
// ask the user for input how many jokes the user wants  
BufferedReader reader = new BufferedReader(new InputStreamReader(System.in));
```

```
// Reading data using readLine  
System.out.println("How many jokes would you like?"); // NO ERROR handling of wrong input here.  
String num = reader.readLine();
```

```
// calling the joked service from the server with num from user input  
client.askForJokes(Integer.valueOf(num));
```

```
// adding a joke to the server  
client.setJoke("I made a pencil with two erasers. It was pointless.");
```

```
// showing 6 joked  
client.askForJokes(Integer.valueOf(6));
```

Client.java (Main)

```
@Override  
public void setJoke(JokeSetReq req, StreamObserver<JokeSetRes> responseObserver) {
```

```
    System.out.println("Received from client: " + req.getJoke());  
    JokeSetRes.Builder response = JokeSetRes.newBuilder();  
    if (req.getJoke().isEmpty()) { // we do not want to add empty jokes  
        response.setOk(false);  
    } else {  
        jokes.add(req.getJoke());  
        response.setOk(true);  
    }  
}
```

JokeImpl.java

Implementations need to
be robust and thorough!

SER 321

Scratch Space

Questions?



Survey:

<http://bit.ly/ASN2324>



Upcoming Events

SI Sessions:

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

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



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



Subject Area Tutoring

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 the tutoring schedule](#)

[View digital resources](#)

Go to Zoom



Writing Tutoring

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-

[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

 **Academic Support Network**

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[University College](#)

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.

Select a subject

- Any -

[Apply](#)



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Select a subject

- Any -

[Apply](#)

Business


ACC 231

Uses of Accounting Info I

 [Peer Community](#)

ACC 241

Uses of Accounting Info II

 [Peer Community](#)

CIS 105

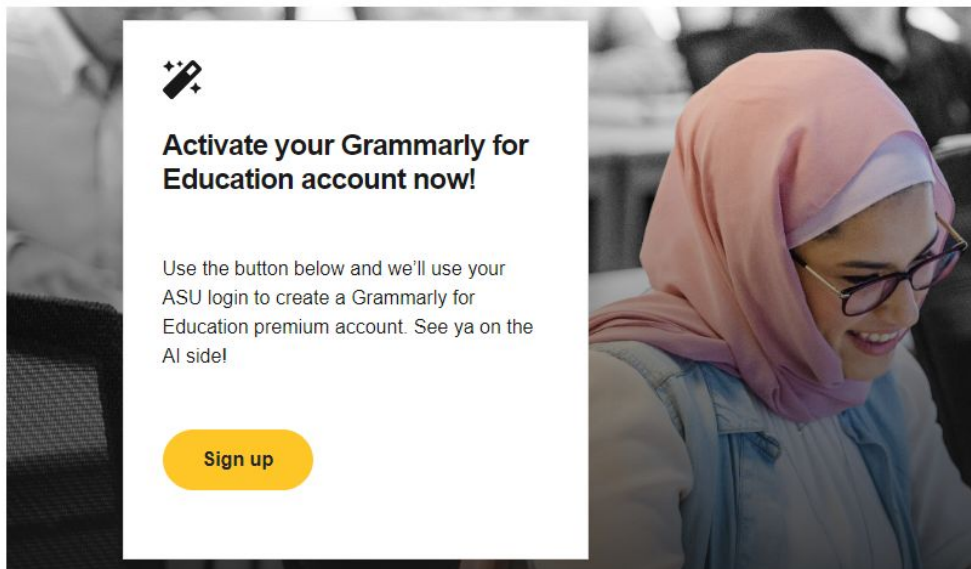
Computer Applications and Information Technology

 [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](#)