

# gRPC

DNP lab 4  
Innopolis University  
Fall 2022

# grpc

Remote Procedure Calls by Google

Based on **protobuf** aka **Protocol Buffers** (also developed by Google)

# Workflow

1. Install gRPC
2. Describe your protocol in **.proto** file
3. Compile your .proto file to generate **stubs**
4. Create your **request handler** using generated stubs
5. Create and start your server using **gRPC** and **request handler**
6. Create your client and connect it to server using **gRPC**

# 1. Install gRPC

Optionally: create venv (virtual python environment)

Command: **pip3 install grpcio grpcio-tools**

**grpcio** - main library for working with grpc


**grpcio-tools** - auxiliary tools, including the **Protobuf compiler**

<https://grpc.io/docs/languages/python/quickstart/>

## 2. Describe your protocol in .proto file

```
1  syntax = "proto3";  
2  
3  ✓ service SimpleService {  
4      |   rpc GetServerResponse(Message) returns (MessageResponse);  
5      |  
6  
7  ✓ message Message {  
8      |   string message = 1;  
9      |  
10  
11  ✓ message MessageResponse {  
12      |   string message = 1;  
13      |   bool received = 2;  
14      |  
15
```

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→ Declare your service

→ Declare methods in your service



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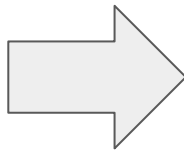
→ Describe messages of your service

### 3. Compile your .proto file to generate stubs

- python3 -m grpc\_tools.protoc **SimpleService.proto** --proto\_path=. --python\_out=. --grpc\_python\_out=.

#### SimpleService.proto

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SimpleService\_pb2.py

SimpleService\_pb2\_grpc.py

### 3. Compile your .proto file to generate stubs

#### **SimpleService\_pb2.py**

- Serialization and message parsing logic

#### **SimpleService\_pb2\_grpc.py**

- Stub for request handler
- Stub for client

## 4. Create your request handler using generated stubs

```
1 import SimpleService_pb2_grpc as pb2_grpc
2 import SimpleService_pb2 as pb2
3
4 class SimpleHandler(pb2_grpc.SimpleServiceServicer):
5     def GetServerResponse(self, request, context):
6         msg = request.message
7         reply = {"message": msg, "received": True}
8         return pb2.MessageResponse(**reply)
9
10
11
12
13
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15
```

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## 5. Create and start your server using gRPC

```
1  import SimpleService_pb2_grpc as pb2_grpc
2  import SimpleService_pb2 as pb2
3  import grpc
4  from concurrent import futures

13 if __name__ == "__main__":
14     server = grpc.server(futures.ThreadPoolExecutor(max_workers=10))
15     pb2_grpc.add_SimpleServiceServicer_to_server(SimpleHandler(), server)
16     server.add_insecure_port("127.0.0.1:5555")
17     server.start()
18     try:
19         server.wait_for_termination()
20     except KeyboardInterrupt:
21         print("Shutting down")
```

## 6. Create your client and connect it to server using gRPC

```
1 import grpc
2 import SimpleService_pb2 as pb2
3 import SimpleService_pb2_grpc as pb2_grpc
4
5
6 if __name__ == "__main__":
7     channel = grpc.insecure_channel("127.0.0.1:5555")
8     stub = pb2_grpc.SimpleServiceStub(channel)
9
10    msg = pb2.Message(message="Hello there!")
11    response = stub.GetServerResponse(msg)
12
13    print(response)
14    print(response.received)
15    print(response.message)
```

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6 if __name__ == "__main__":
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# Your task

Develop a server and a client using gRPC

# Server

> **python3 server.py 5555**

Has following functions:

- **reverse(text: str) -> str** – returns reversed string
- **split(text: str, delim:str) -> (int, [str])** – splits the text by delimiter. Returns number of parts and parts themselves
- **isprime(num: int) -> str** – checks if number is prime or not. This is a **stream** function, which means it accepts a stream of numbers and returns a stream of answers

Server must support multiple clients

# Client

> **python3 client.py 127.0.0.1:5555**

Continuously listens to client input and executes commands:

- **reverse <some text>** – rpc call
- **split <some text>** – rpc call – split text by whitespaces
- **isprime <list of numbers>** – rpc call  
Example: isprime 2 10 5555 14567
- **exit** – stops loop and exits program

# Submission

Submit your:

- server.py
- client.py
- service.proto

as a single **.zip** archive

# Example

## **python3 client.py**

```
> reverse Hello there!  
message: "!ereht olleH"
```

```
> split Hello there!  
number: 2  
parts: "Hello"  
parts: "there!"
```

```
> isprime 2 5 7 9 10  
2 is prime  
5 is prime  
7 is prime  
9 is not prime  
10 is not prime  
> exit  
Shutting down
```