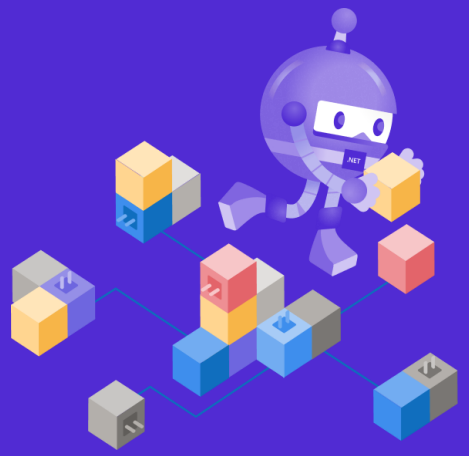
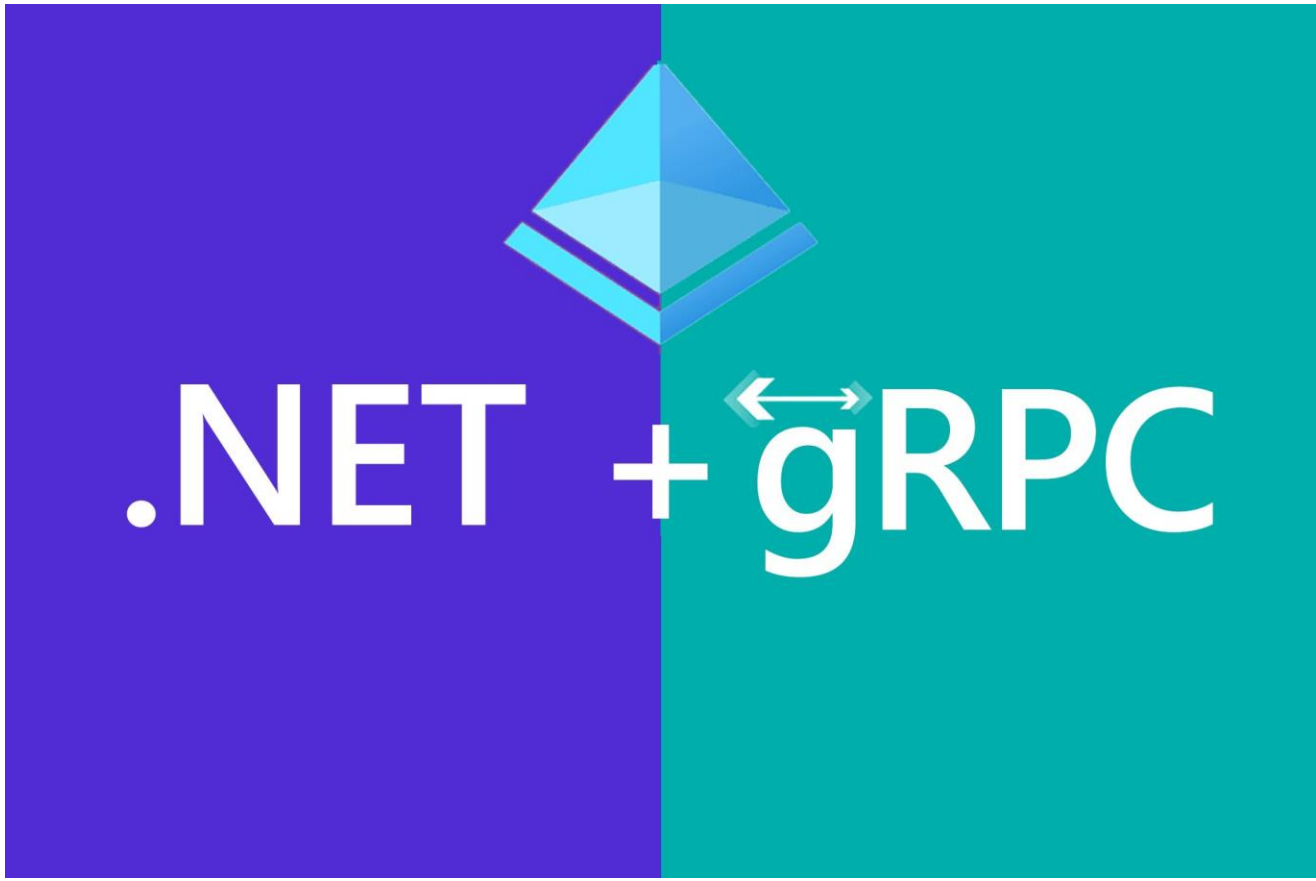
Using gRPC in Microservices Communication w/ .Net5



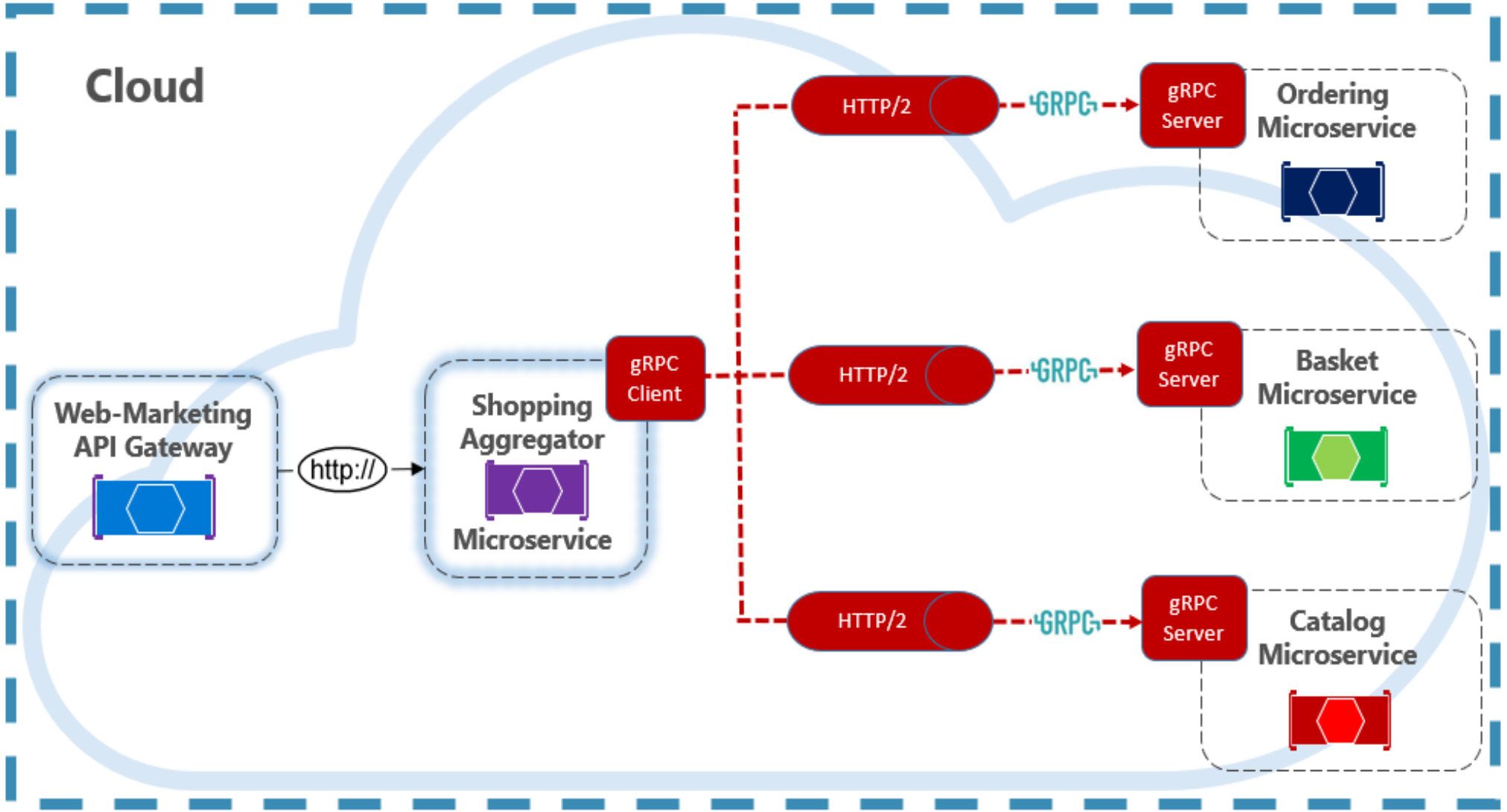
Mehmet Ozkaya
Software Architect, .NET
@ezozkme

gRPC in Microservices Communication

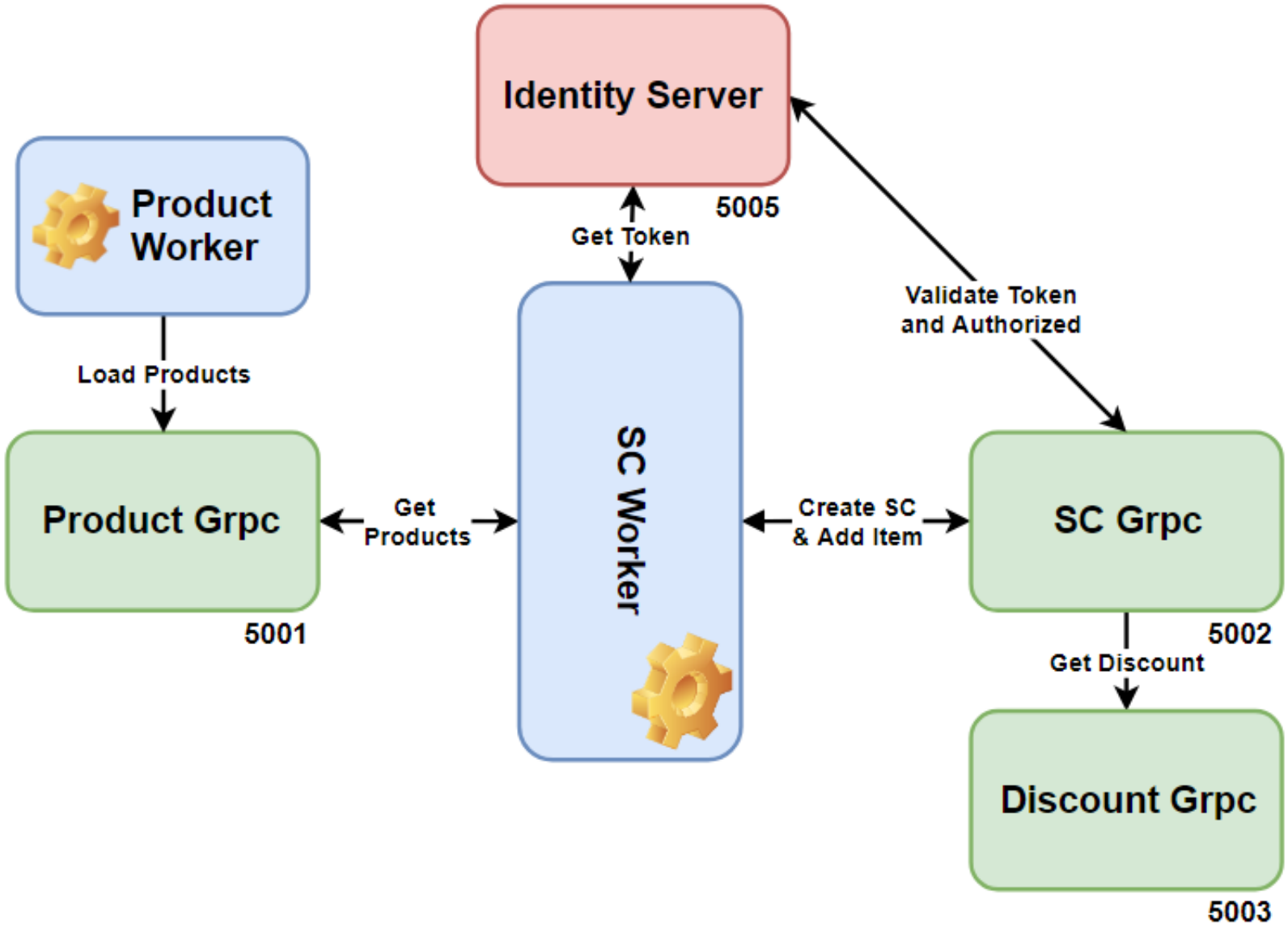
- Highly Performant Inter-service Communication
- Modern distributed system
- HTTP/2 as base transport protocol and ProtoBuf encoding
- first-class support for creating gRPC services with Asp.Net 5



gRPC usage of Microservices



Big Picture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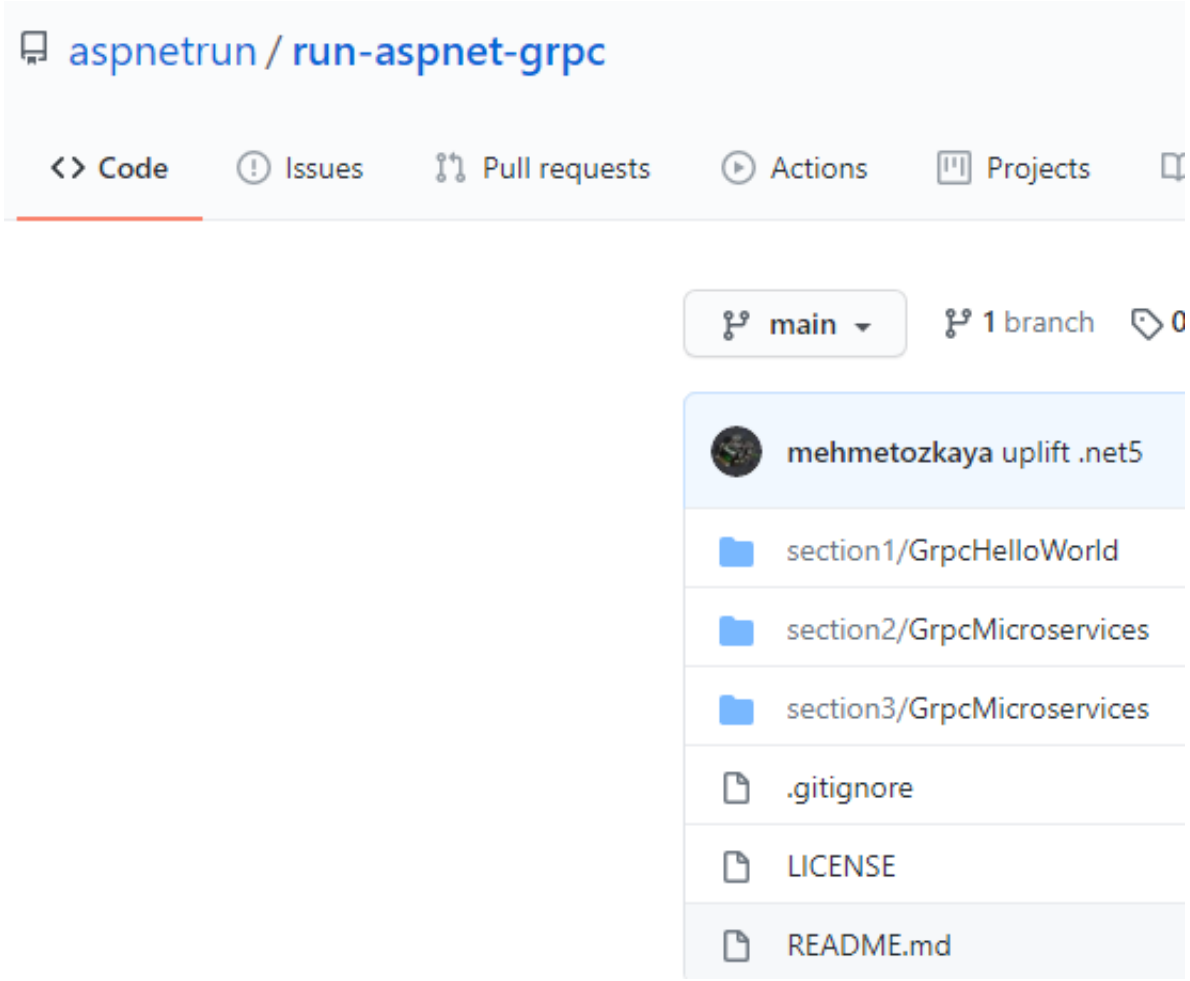
5003

Prerequisites

- Good knowledge of C#
- Have knowledge of Asp.Net 5 Web Applications
- No need to know about gRPC
- Basics of Microservices Architecture

Source Code on Github

- Source code on Github
- Fork the repository
- Open issues
- Send Pull Requests



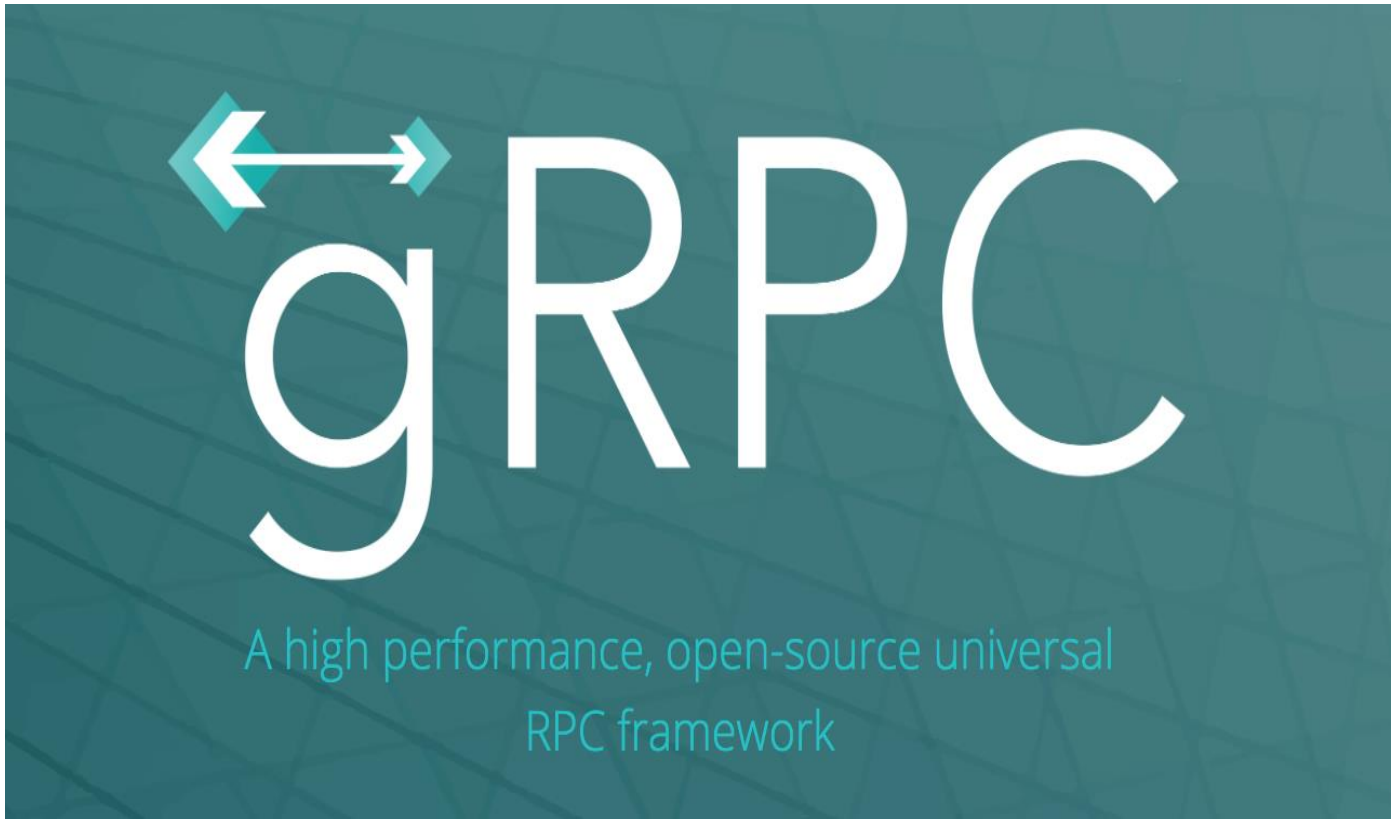
https://github.com/aspnetrun/run-aspnet-grpc

Tooling

- Visual Studio 2019 v16.8
- gRPCurl

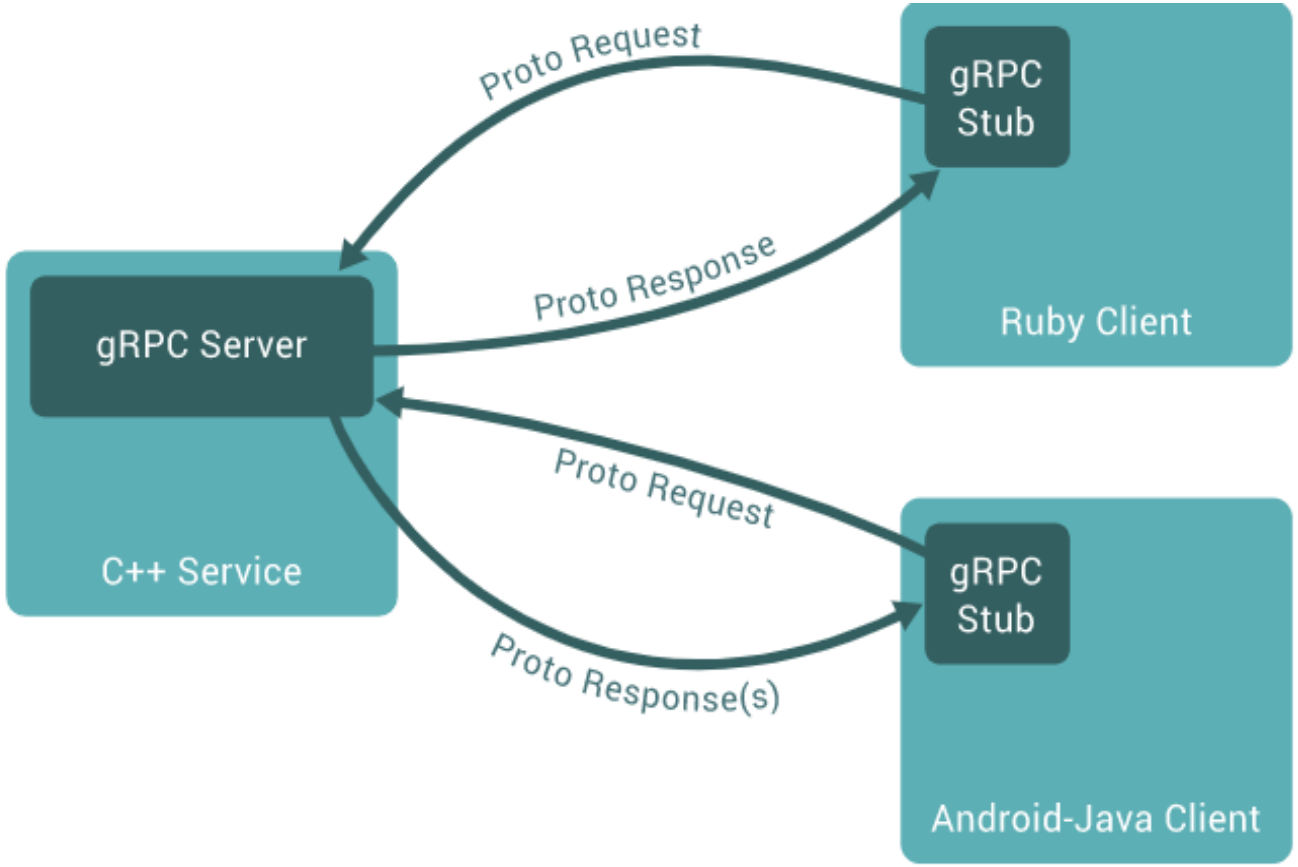
What is gRPC ?

- gRPC (gRPC Remote Procedure Calls)
- HTTP/2 protocol to transport binary messages
- Protocol Buffers, also known as Protobuf files
- Cross-platform client and server bindings



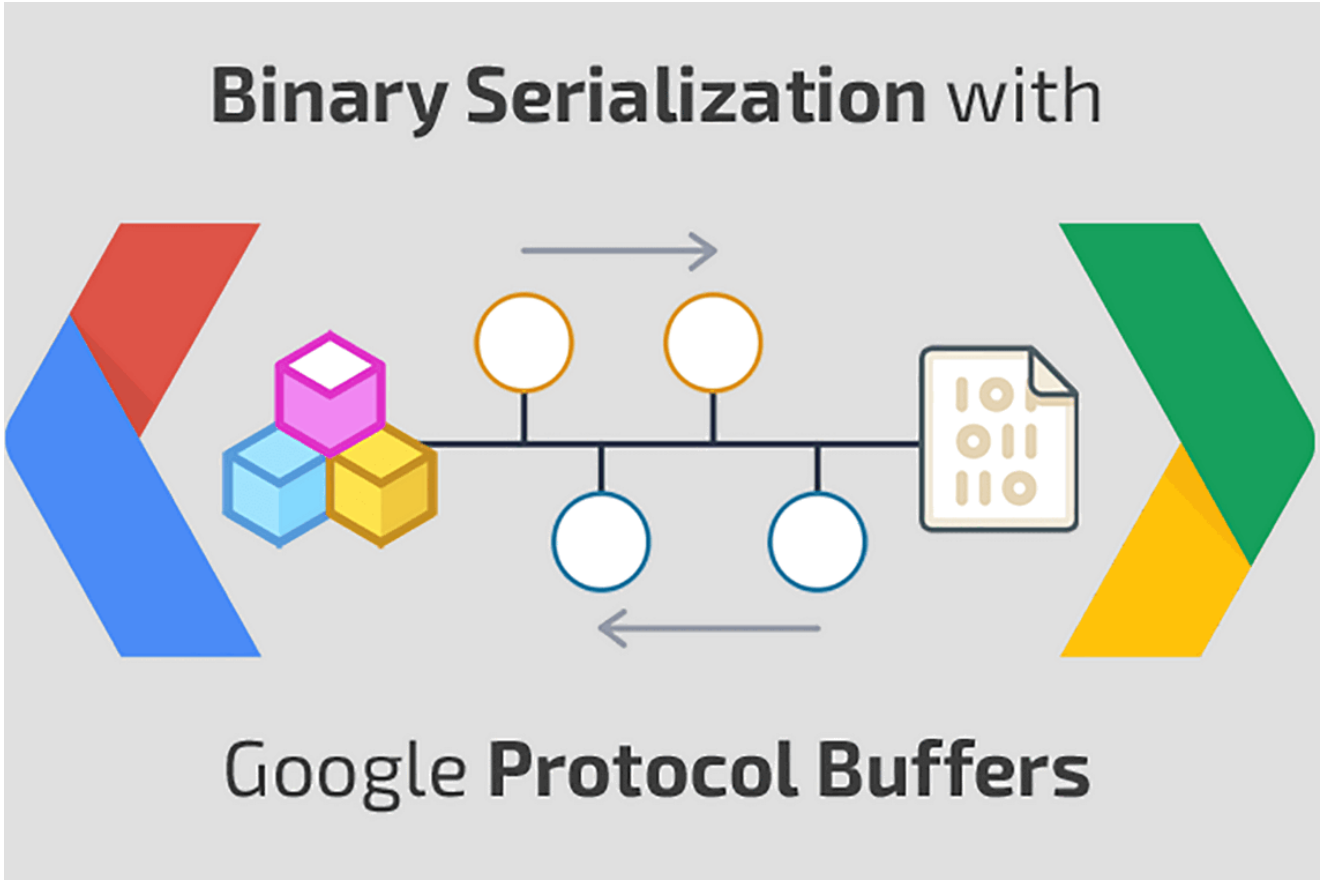
How gRPC works ?

- gRPC directly call a method on a server
- Build distributed applications and services
- Defining a service that specifies methods that can be called remotely
- Can be written in any language that gRPC supports



Working with Protocol Buffers

- gRPC uses Protocol Buffers by Default.
- Protocol Buffers are Google's open source mechanism for serializing structured data.
- serialize in a proto file with the extension .proto.
- Series of name-value pairs



Working with Protocol Buffers 2

- Protocol buffer compiler protocol to create data access classes
- Simple accessors for each field such as name () and set_name (), and methods to serialize
- https://developers.google.com/protocol-buffers/docs/overview

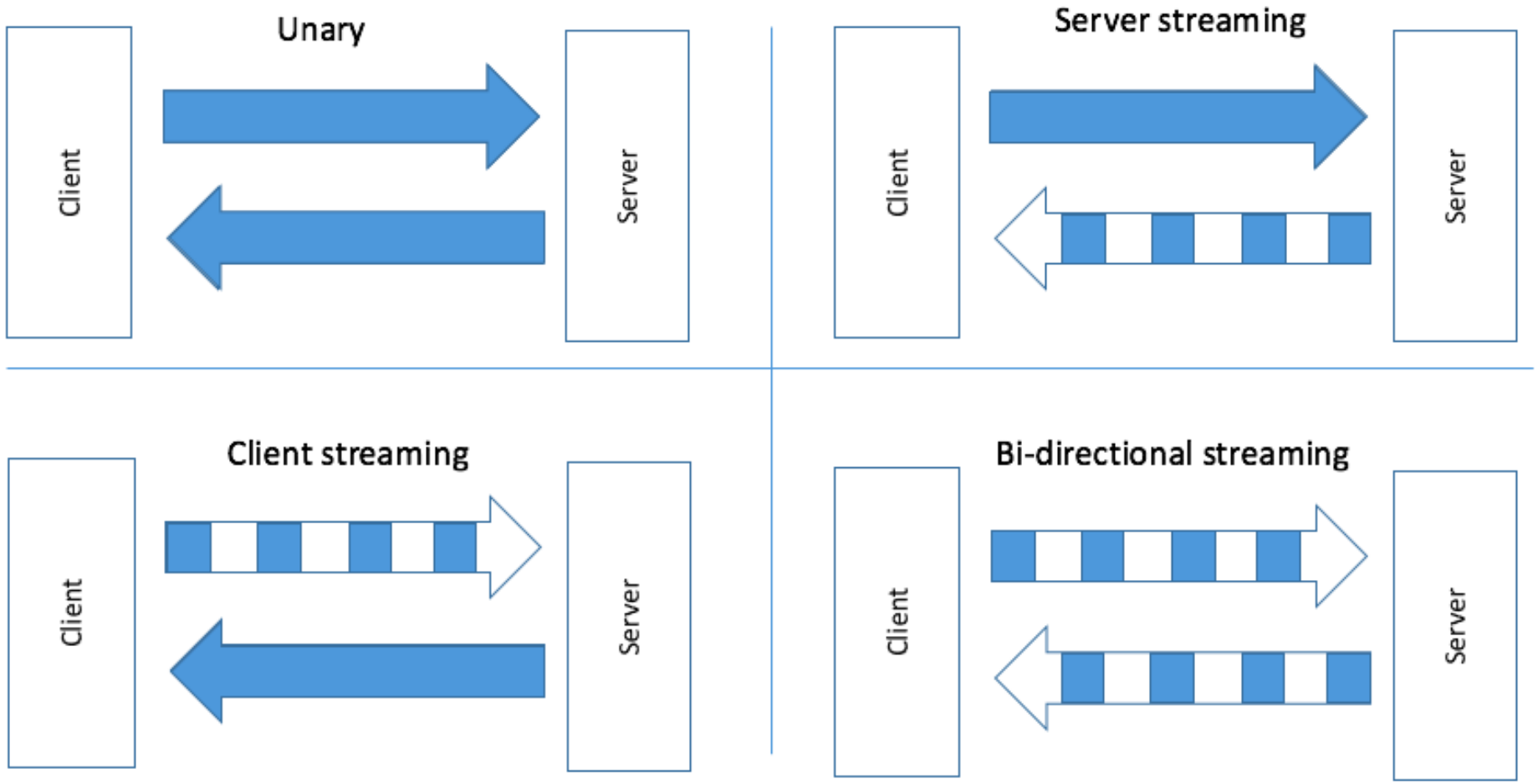
```
message Person {
  string name = 1;
  int32 id = 2;
  bool has_ponycopter = 3;
}
```

Working with Protocol Buffers 3

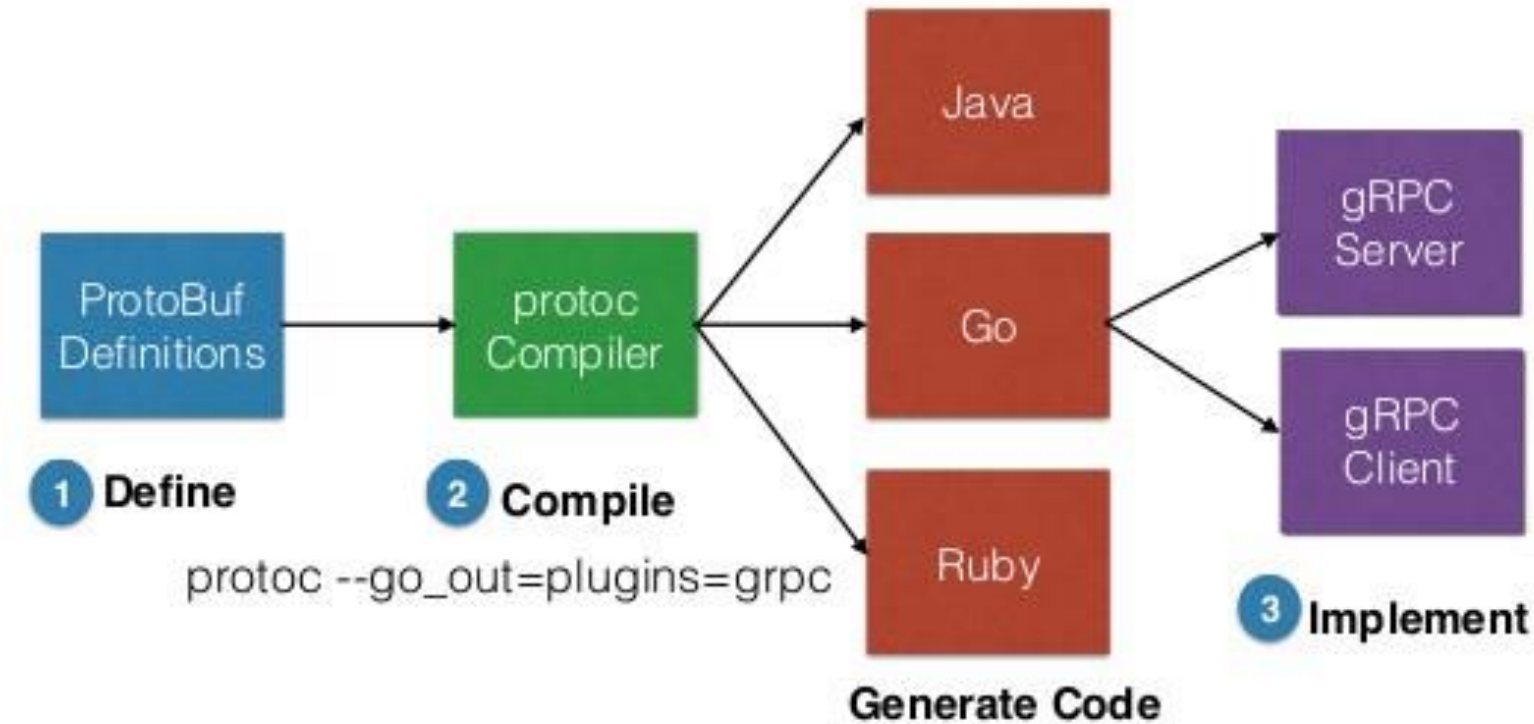
- gRPC service proto files
- RPC method parameters and protocol buffer messages
- https://developers.google.com/protocol-buffers/docs/overview

```
// The greeter service definition.
service Greeter {
  // Sends a greeting
  rpc SayHello (HelloRequest) returns (HelloReply) {}
}

// The request message containing the user's name.
message HelloRequest {
  string name = 1;
}

// The response message containing the greetings
message HelloReply {
  string message = 1;
}
```

gRPC Method Types - RPC life cycles



gRPC Workflow



Advantages of gRPC

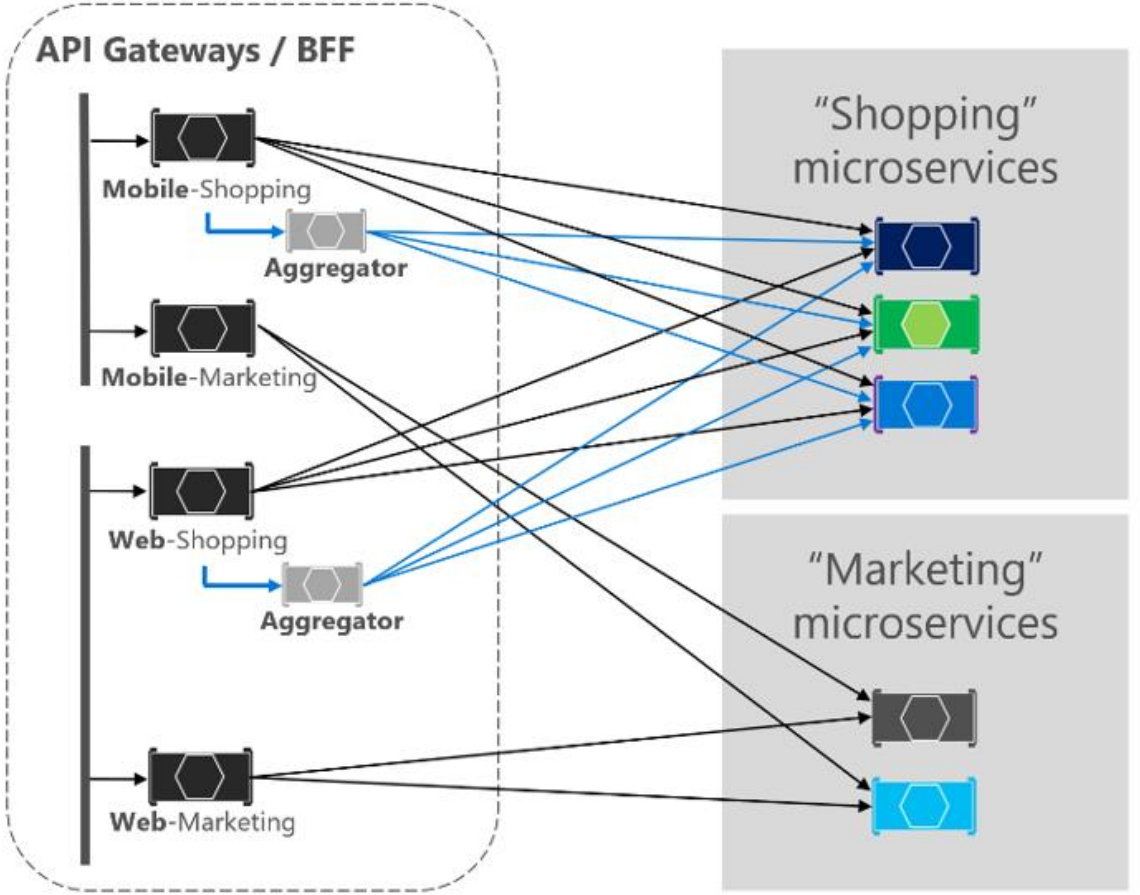
- Using HTTP / 2
- Binary serialization
- Supporting a wide audience with multi-language / platform support
- Open Source and the powerful community behind it
- Supports Bi-directional Streaming operations

gRPC vs REST

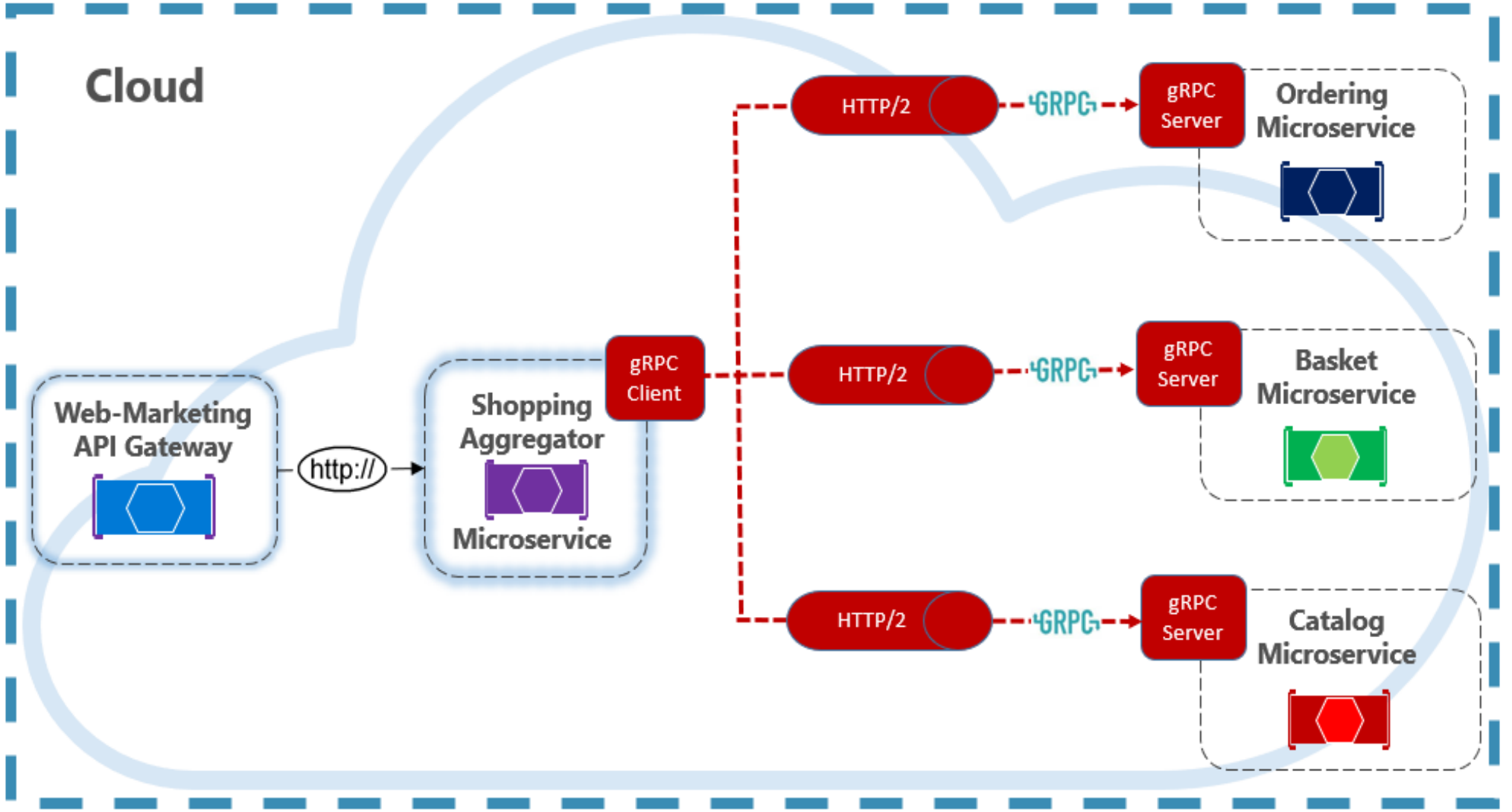
	Goal	REST (HTTP/JSON)	gRPC
COMPATIBILITY	Single source of truth	✗	✔
	Multi-platform + languages built in	✗	✔
	Handle non-breaking changes.	✗	✔
PERFORMANCE	Network: connection handling	Manual, 1 per call ✗	Built-in, Multi per conn ✔
	Speed: Transmission of data	Human-readable Text ✗	Binary ✔
	CPU: Improved resource usage	✗	✔
MAINTENANCE	Tracing	Manual ✗	Easy to plug in ✔
	Logging	Manual ✗	Easy to plug in ✔
	Monitoring	Manual ✗	Easy to plug in ✔

gRPC usage of Microservices Communication

- Synchronous backend microservice-to-microservice communication
- Polyglot environments
- Low latency and high throughput communication
- Point-to-point real-time communication
- Network constrained environments

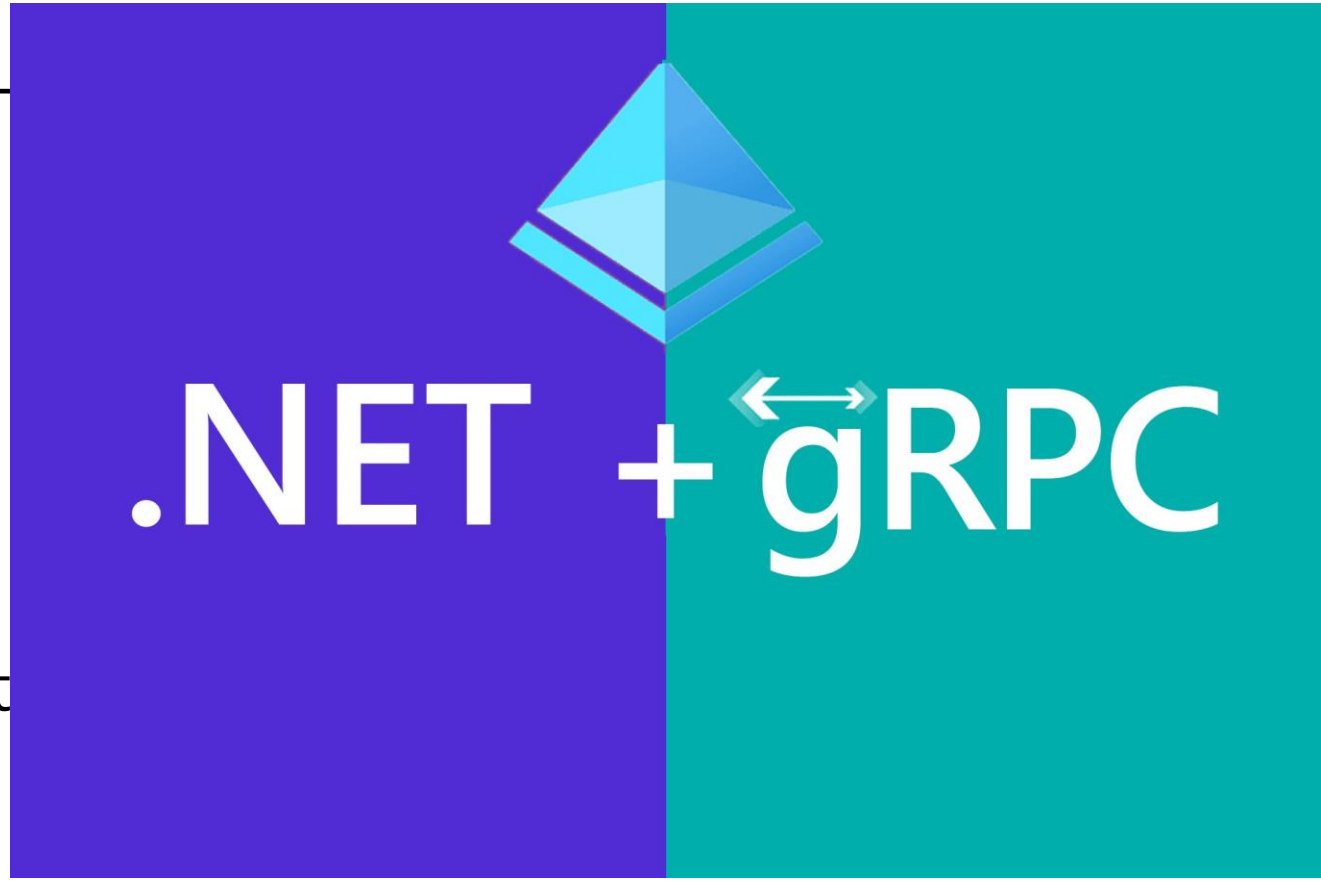


Example of gRPC in Microservices

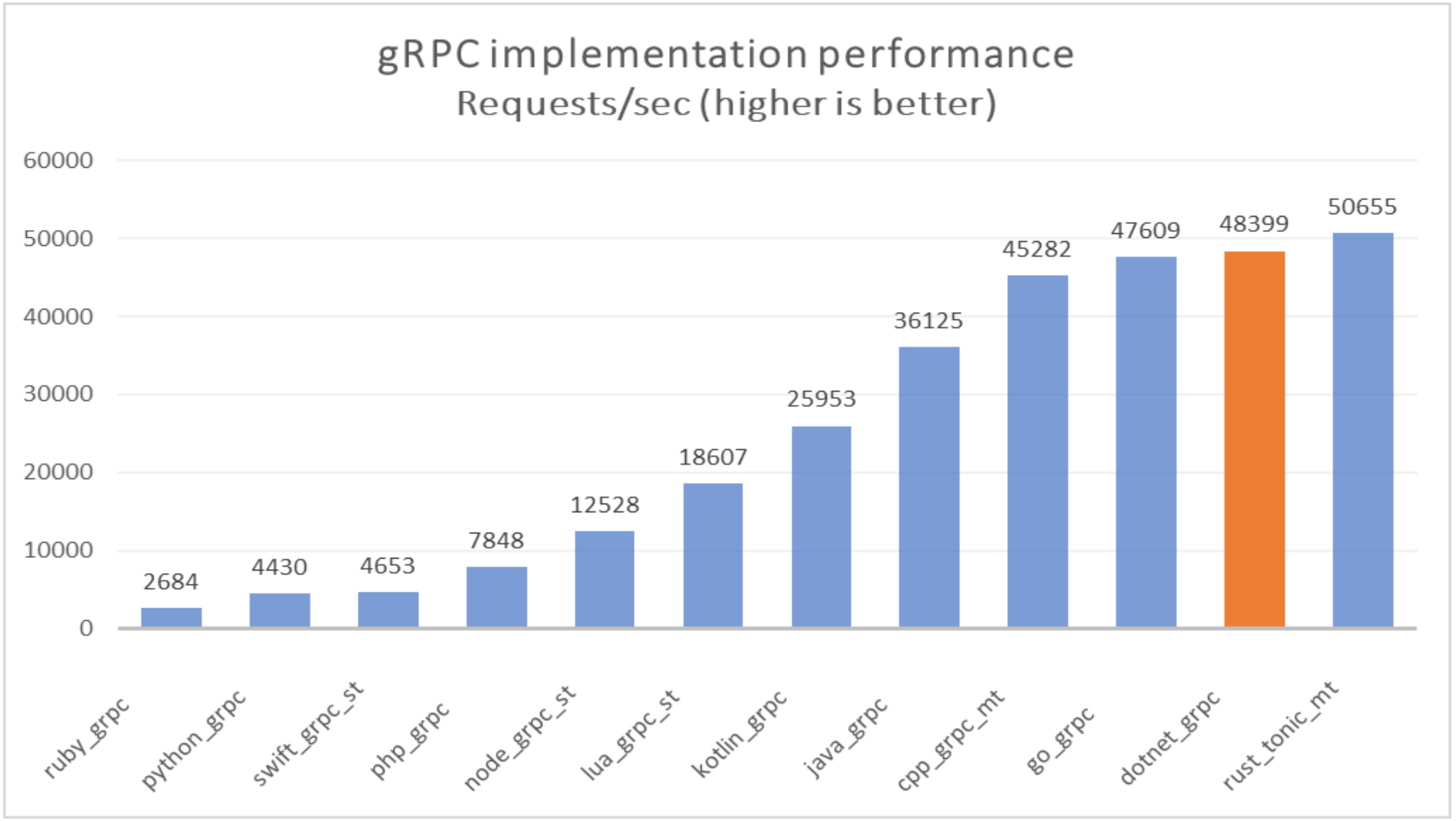


gRPC with .NET 5

- First-class support for gRPC .NET
- Contributed a new implementation of gRPC
- Integrated into .NET Core 3.0 SDK and later
- Visual Studio 2019 template that scaffolds a skeleton project



gRPC performance in .NET 5



- https://devblogs.microsoft.com/aspnet/grpc-performance-improvements-in-net-5/

END OF SECTION

Next Section

HelloWorld gRPC with Asp.Net 5

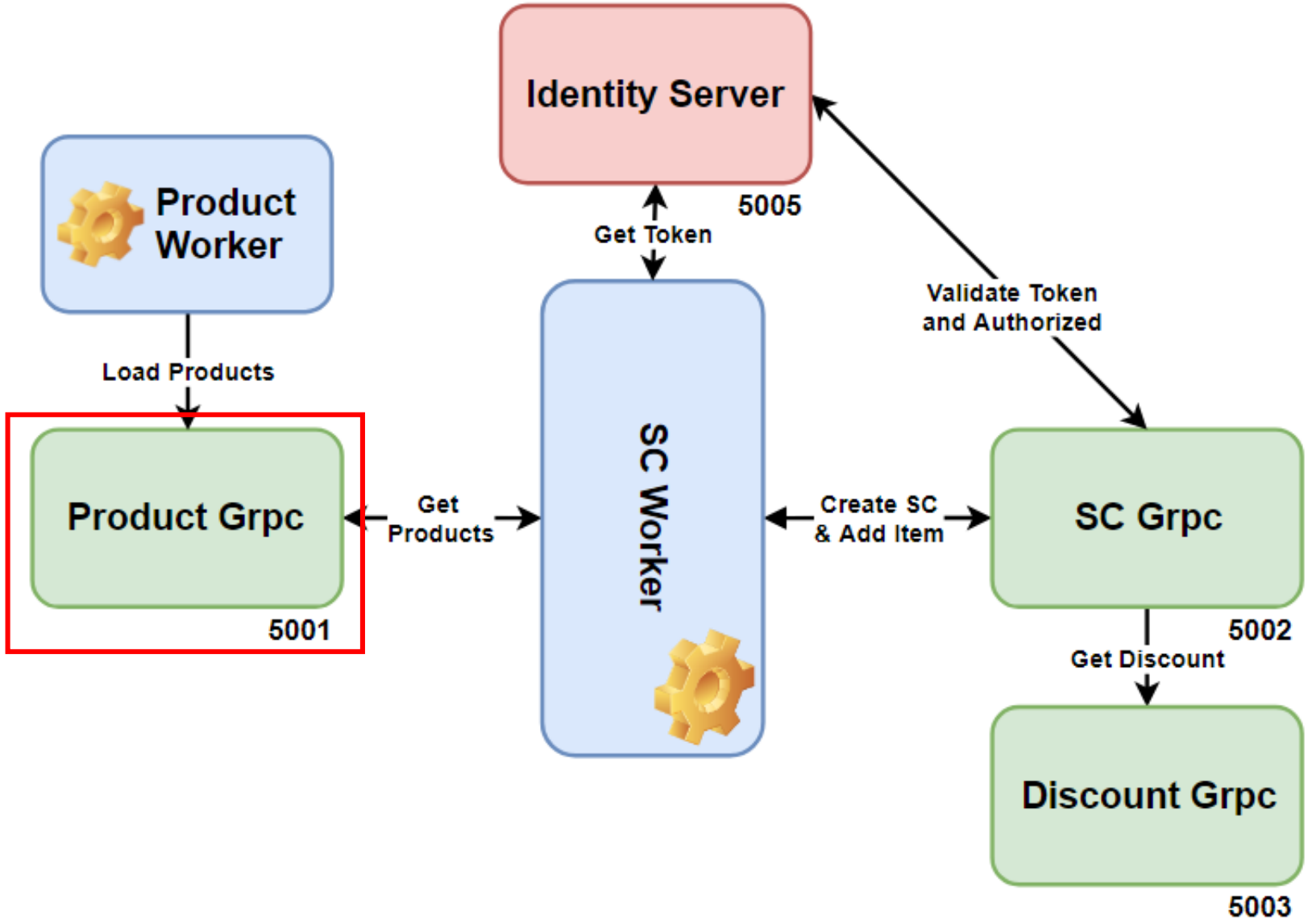
Section 2
HelloWorld gRPC with Asp.Net 5

for building HelloWorld Asp.Net gRPC Project

Section 3
Building Product Grpc Microservices

for Exposing Product CRUD APIs

Big Picture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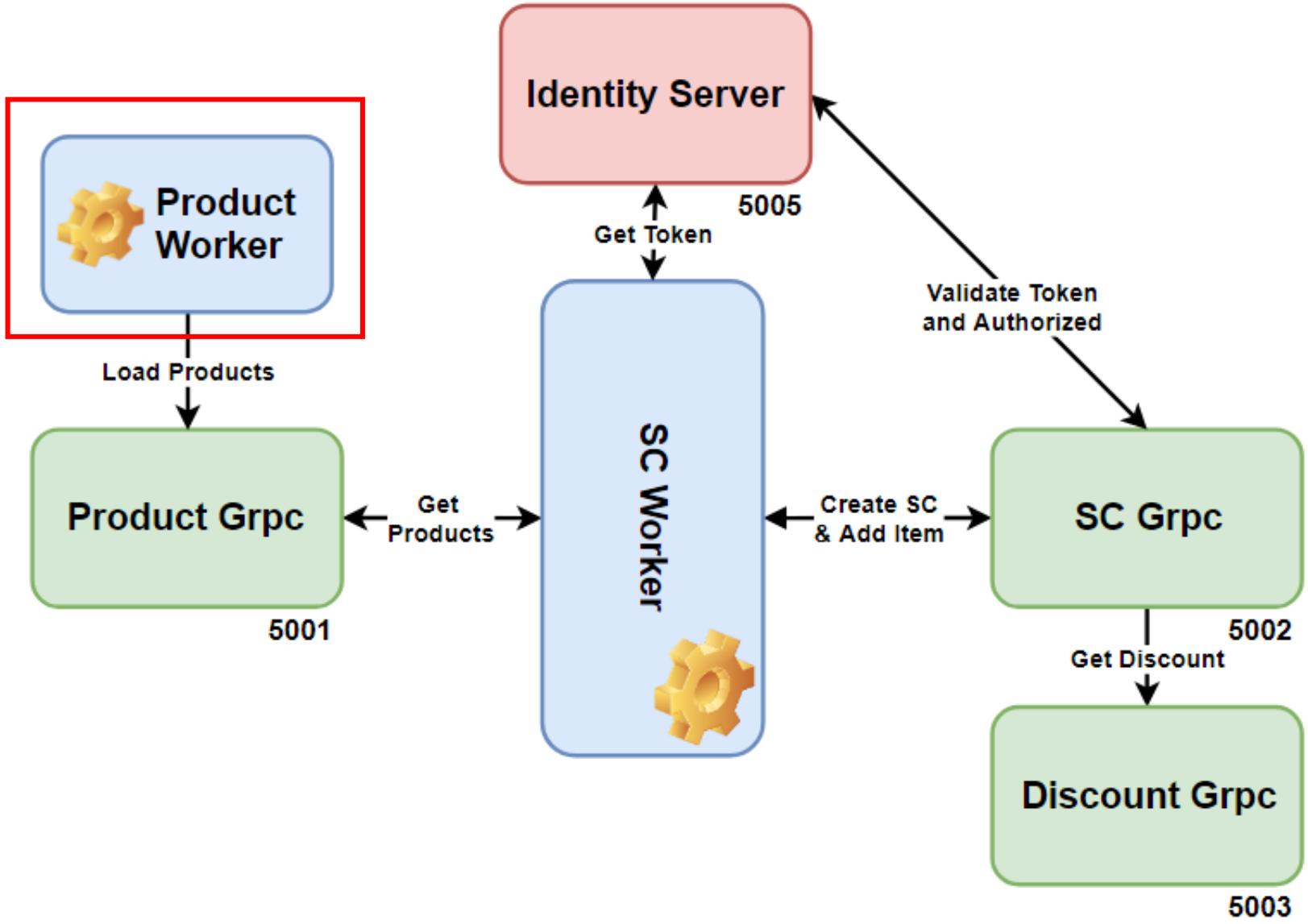
Section 4
Building Product WorkerService Microservices

for Generate and Insert Product to ProductGrpc Microservices

Big Picture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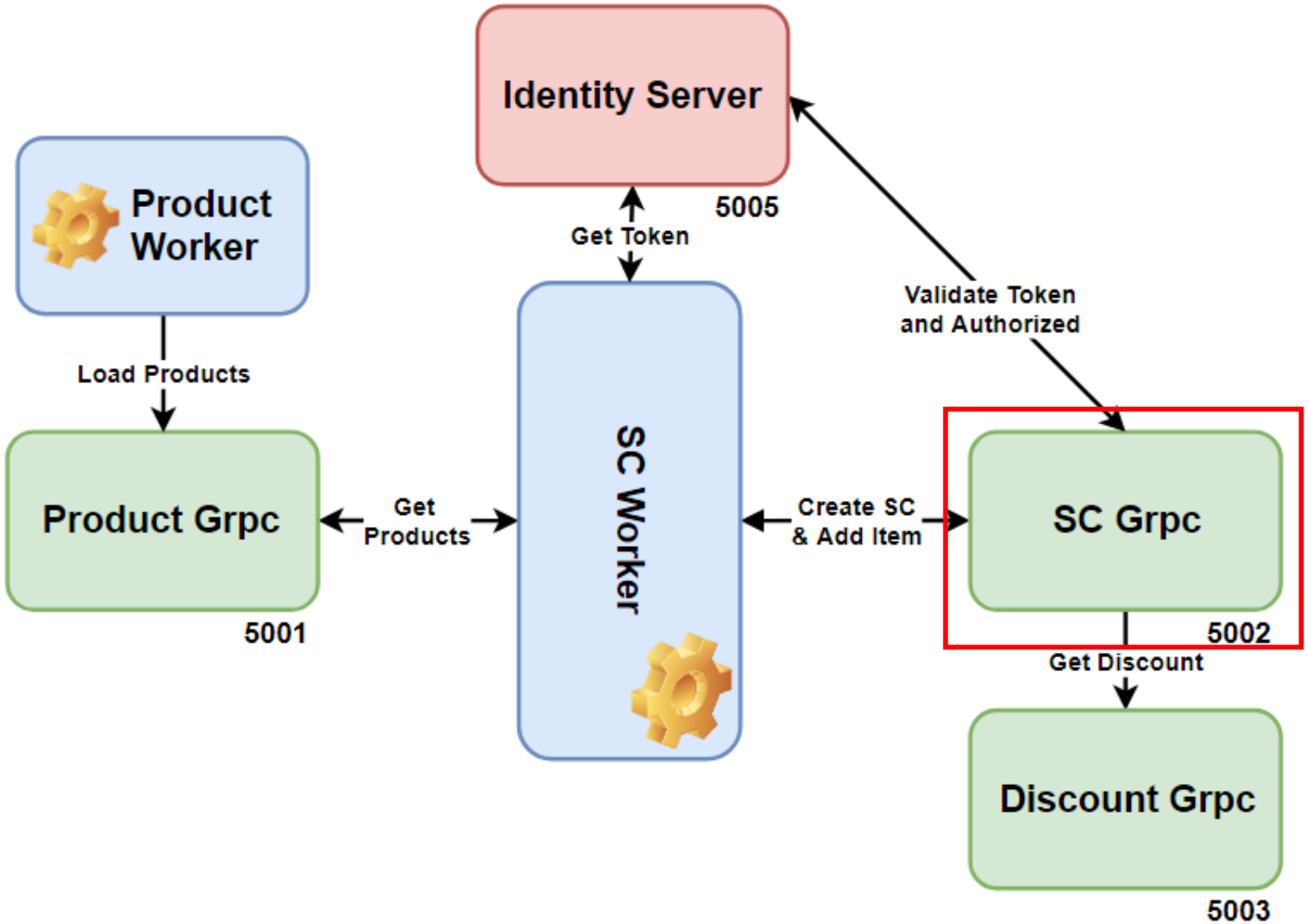
Section 5
Building Shopping Cart Grpc Server Application

for Storing Products into Cart

Big Picture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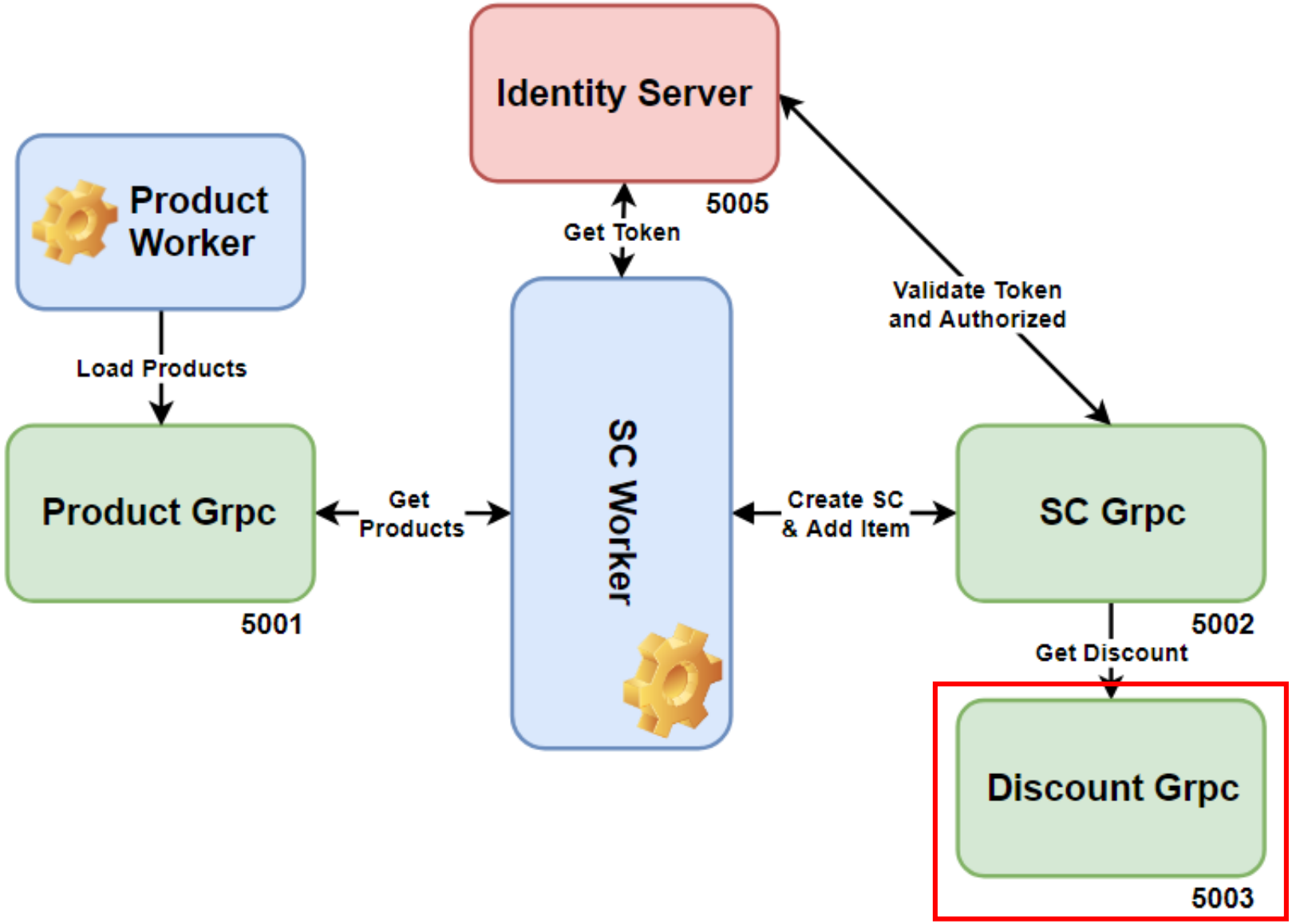
Section 6
Building Dicsount Grpc Microservice

for Inter-Service Communication for Calculating Every Cart Item Last Price

Big Picture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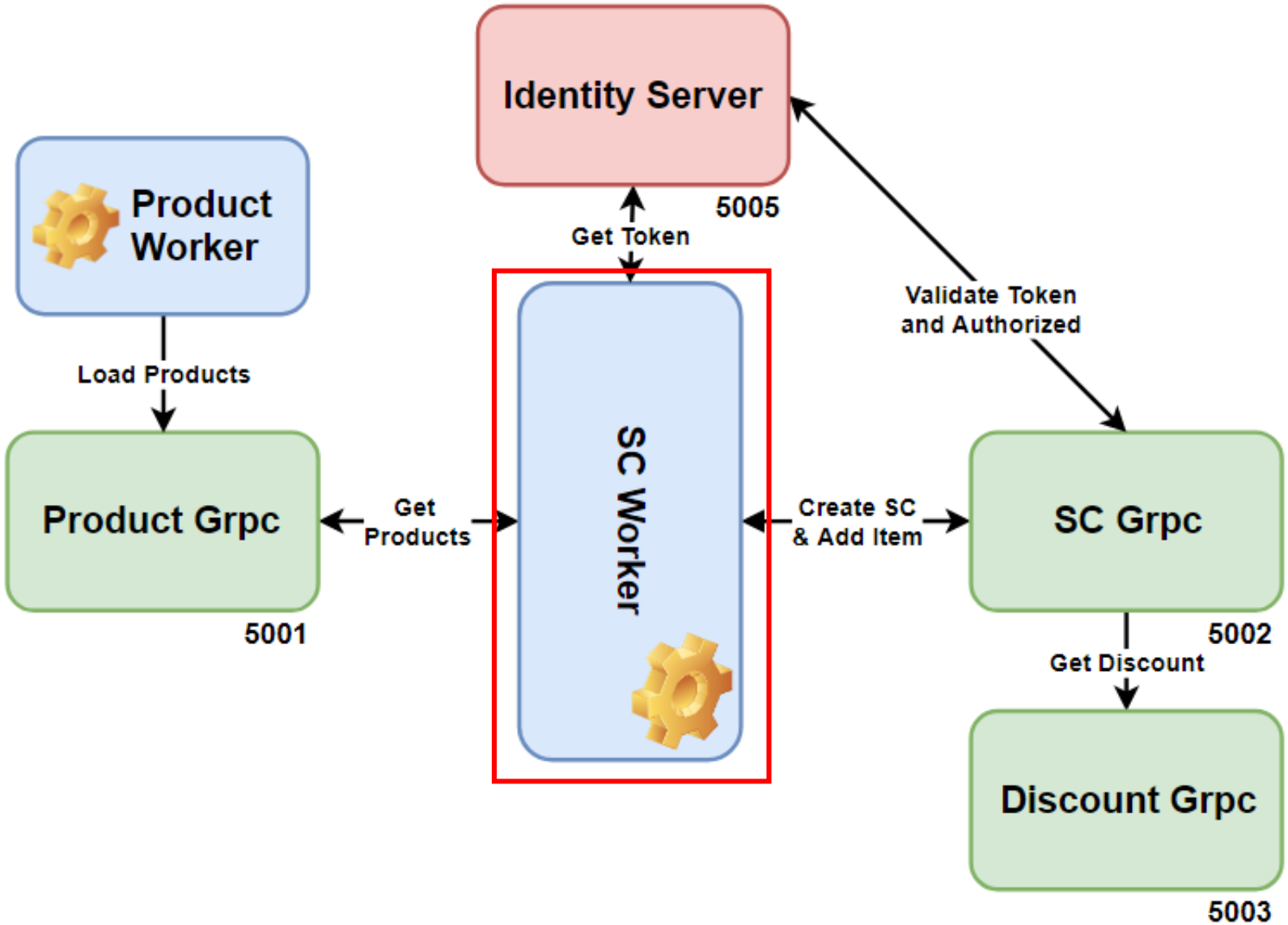
Section 7
Building ShoppingCart WorkerService Microservice

for Retrieve Products and Add to ShoppingCart with consuming ProductGrpc and ShoppingCartGrpc Microservices

Big Picture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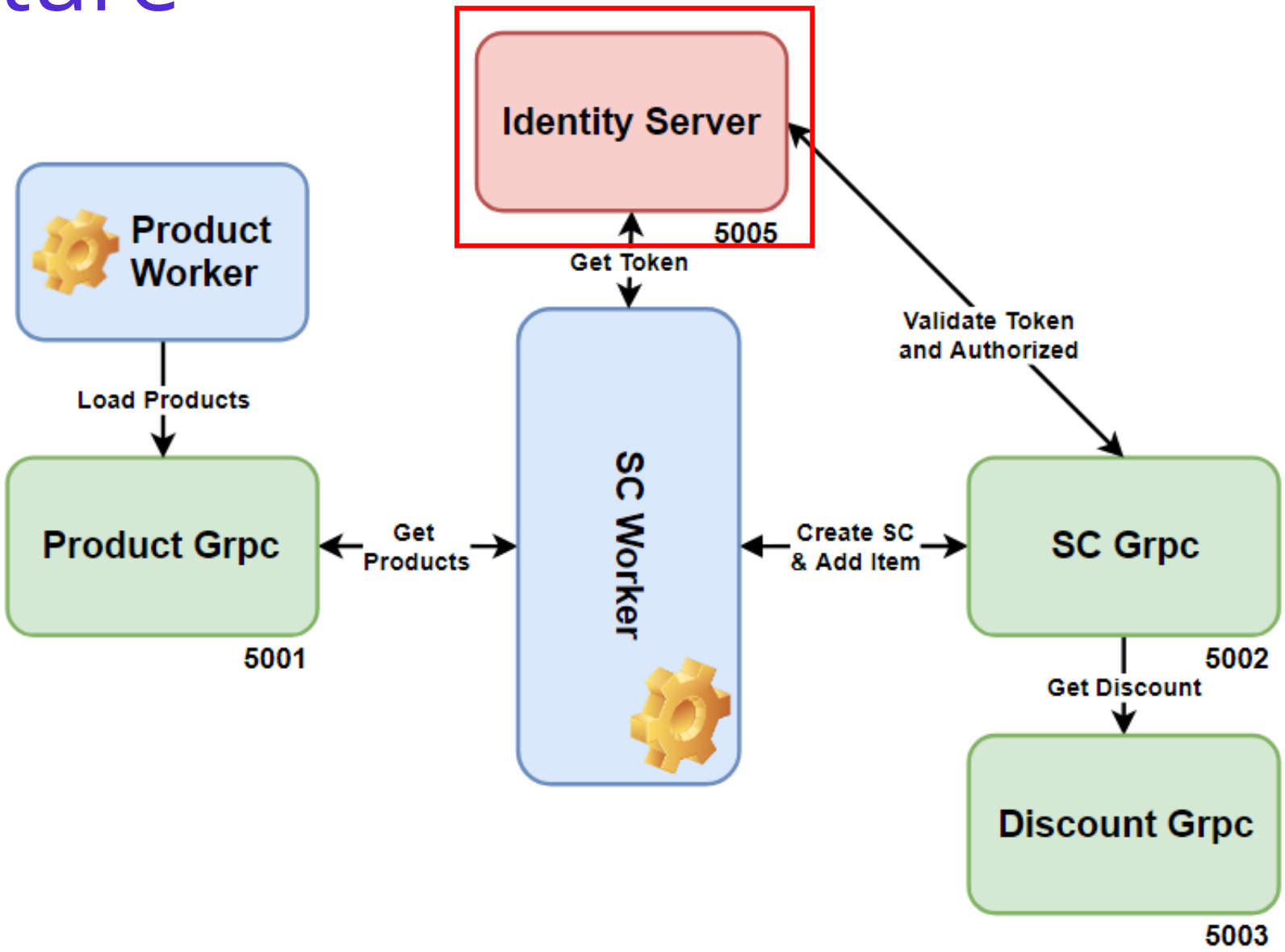
Section 8
Authenticate gRPC Services with IdentityServer4

for protect ShoppingCartGrpc Method with OAuth 2.0 and JWT Bearer Token

Big Picture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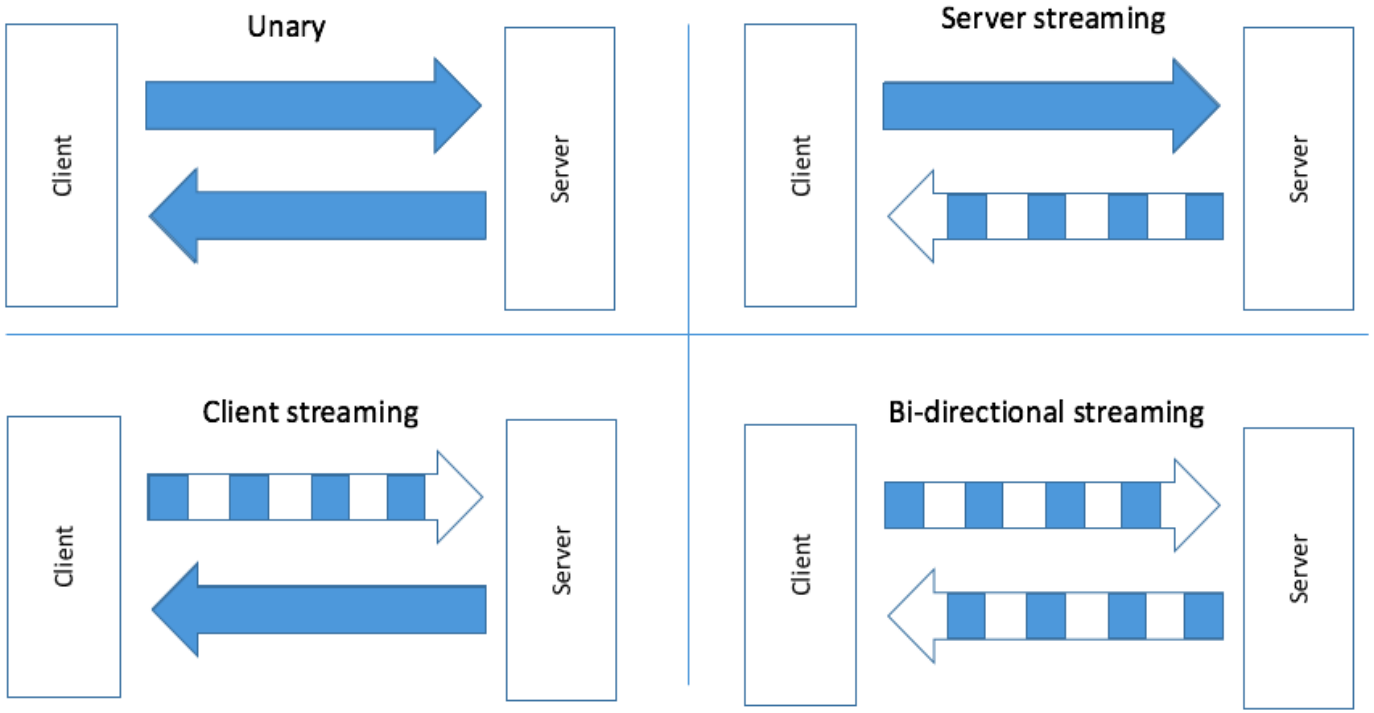
Assignment - Bidirectional streaming RPCs with Support Microservices

- Bidirectional streaming RPCs
- Support gRPC Server
- AI-powered assistant with chatting on the user channel
- Bi-directional streaming gRPC communication with client and Support gRPC server
- Share your repositories with me



Source Code on Github

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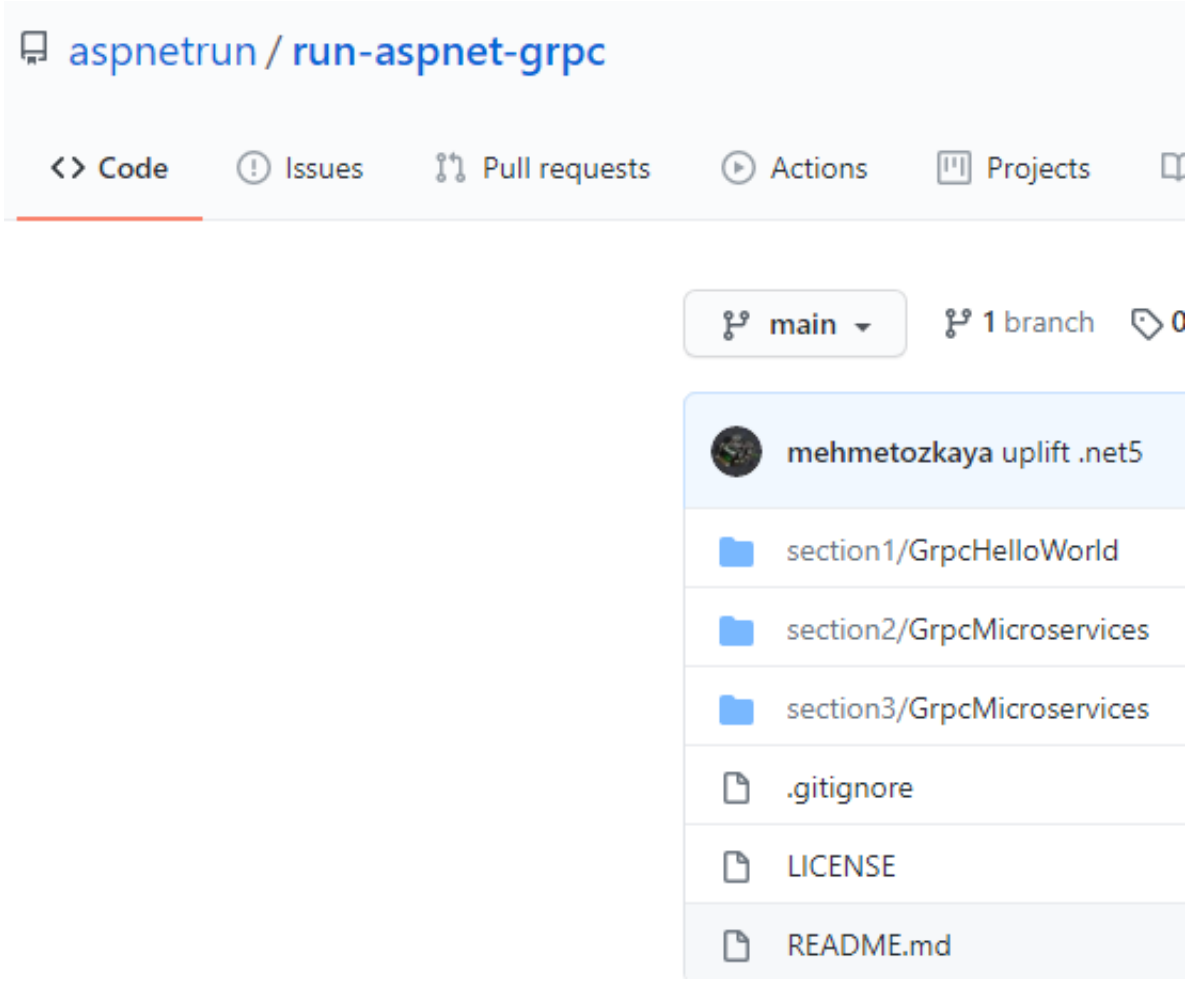

https://github.com/aspnetrun/run-aspnet-grpc

Thanks!

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