

# Implementing a gRPC Service

gRPC service implementations exposed as beans are automatically registered and served by quarkus-grpc.



Implementing a gRPC service requires the gRPC classes to be generated. Place your `proto` files in `src/main/proto` and run `mvn compile`.

## Implementation base

The generation has created 2 implementation bases:

1. One using the default gRPC API
2. One using the Mutiny API

The first classname is structured as follows:  
`${NAME_OF_THE_SERVICE}Grpc.${NAME_OF_THE_SERVICE}ImplBase`. The second classname is structured as follows:  
`Mutiny${NAME_OF_THE_SERVICE}Grpc.${NAME_OF_THE_SERVICE}ImplBase`.

For example, if you use `Greeter` as service name as in:

```
service Greeter {  
    rpc SayHello (HelloRequest) returns (HelloReply) {}  
}
```

The regular implementation base is: `GreeterGrpc.GreeterImplBase`. The second implementation base is: `MutinyGreeterGrpc.GreeterImplBase`.

Note that these classes are not interfaces but regular classes. When extending them, you need to override the service methods defined in the service definition.

## Implementing a service with the default gRPC API

To implement a gRPC service using the default gRPC API, create a class extending the default implementation base. Then, override the methods defined in the service interface. Finally, expose the service as a CDI bean using the `@Singleton` annotation:

```
import javax.inject.Singleton;

@Singleton
public class HelloService extends GreeterGrpc.GreeterImplBase {

    @Override
    public void sayHello>HelloRequest request,
    StreamObserver>HelloReply> responseObserver) {
        String name = request.getName();
        String message = "Hello " + name;

        responseObserver.onNext>HelloReply.newBuilder().setMessage(message)
        .build());
        responseObserver.onCompleted();
    }
}
```

## Implementing a service with the Mutiny API

To implement a gRPC service using the Mutiny gRPC API, create a class extending the Mutiny implementation base. Then, override the methods defined in the service interface. These methods are using Mutiny types. Finally, expose the service as a CDI bean using the `@Singleton` annotation:

```
import javax.inject.Singleton;

@Singleton
public class ReactiveHelloService extends
    MutinyGreeterGrpc.GreeterImplBase {

    @Override
    public Uni>HelloReply> sayHello>HelloRequest request) {
        return Uni.createFrom().item(() ->
           >HelloReply.newBuilder().setMessage("Hello " +
request.getName()).build()
        );
    }
}
```

## Handling streams

gRPC allows receiving and returning streams:

```
service Streaming {  
    rpc Source(Empty) returns (stream Item) {} // Returns a stream  
    rpc Sink(stream Item) returns (Empty) {}    // Reads a stream  
    rpc Pipe(stream Item) returns (stream Item) {} // Reads a  
streams and return a streams  
}
```

Using Mutiny, you can implement these as follows:

```

@Singleton
public class StreamingService extends
MutinyStreamingGrpc.StreamingImplBase {

    @Override
    public Multi<Item> source(Empty request) {
        // Just returns a stream emitting an item every 2ms and
        // stopping after 10 items.
        return
Multi.createFrom().ticks().every(Duration.ofMillis(2))
        .transform().byTakingFirstItems(10)
        .map(l ->
Item.newBuilder().setValue(Long.toString(l)).build());
    }

    @Override
    public Uni<Empty> sink(Multi<Item> request) {
        // Reads the incoming streams, consume all the items.
        return request
            .map(Item::getValue)
            .map(Long::parseLong)
            .collectItems().last()
            .map(l -> Empty.newBuilder().build());
    }

    @Override
    public Multi<Item> pipe(Multi<Item> request) {
        // Reads the incoming stream, compute a sum and return the
        // cumulative results
        // in the outbound stream.
        return request
            .map(Item::getValue)
            .map(Long::parseLong)
            .onItem().scan(() -> 0L, Long::sum)
            .onItem().transform(l ->
Item.newBuilder().setValue(Long.toString(l)).build());
    }
}

```

## Health check

For the exposed services, Quarkus gRPC exposes health information in the following format:

```

syntax = "proto3";

package grpc.health.v1;

message HealthCheckRequest {
    string service = 1;
}

message HealthCheckResponse {
    enum ServingStatus {
        UNKNOWN = 0;
        SERVING = 1;
        NOT_SERVING = 2;
    }
    ServingStatus status = 1;
}

service Health {
    rpc Check(HealthCheckRequest) returns (HealthCheckResponse);

    rpc Watch(HealthCheckRequest) returns (stream
HealthCheckResponse);
}

```

Clients can specify the fully qualified service name to get the health status of a specific service or skip specifying the service name to get the general status of the gRPC server.

For more details, check out the [gRPC documentation](#)

Additionally, if Quarkus SmallRye Health is added to the application, a readiness check for the state of the gRPC services will be added to the MicroProfile Health endpoint response, that is `/health`.

## Reflection Service

Quarkus gRPC Server implements the [reflection service](#). This service allows tools like [grpcurl](#) or [grpcurl](#) to interact with your services.


The reflection service is enabled by default in *dev* mode. In test or production mode, you need to enable it explicitly by setting `quarkus.grpc.server.enable-reflection-service` to `true`.


## Scaling

By default, quarkus-grpc starts a single gRPC server running on a single event loop.

If you wish to scale your server, you can set the number of server instances by setting `quarkus.grpc.server.instances`.

# Server configuration

 Configuration property fixed at build time - All other configuration properties are overridable at runtime

Configure the gRPC server	Type	Default
<code>quarkus.grpc.server.port</code> The gRPC Server port.	int	9000
<code>quarkus.grpc.server.host</code> The gRPC server host.	string	0.0.0.0
<code>quarkus.grpc.server.handshake-timeout</code> The gRPC handshake timeout.	Duration 	
<code>quarkus.grpc.server.max-inbound-message-size</code> The max inbound message size in bytes.	int	
<code>quarkus.grpc.server.ssl.certificate</code> The file path to a server certificate or certificate chain in PEM format.	path	
<code>quarkus.grpc.server.ssl.key</code> The file path to the corresponding certificate private key file in PEM format.	path	
<code>quarkus.grpc.server.ssl.key-store</code> An optional key store which holds the certificate information instead of specifying separate files.	path	
<code>quarkus.grpc.server.ssl.key-store-type</code> An optional parameter to specify the type of the key store file. If not given, the type is automatically detected based on the file name.	string	
<code>quarkus.grpc.server.ssl.key-store-password</code> A parameter to specify the password of the key store file. If not given, the default ("password") is used.	string	password

<code>quarkus.grpc.server.ssl.trust-store</code>	An optional trust store which holds the certificate information of the certificates to trust	path	
<code>quarkus.grpc.server.ssl.trust-store-type</code>	An optional parameter to specify type of the trust store file. If not given, the type is automatically detected based on the file name.	string	
<code>quarkus.grpc.server.ssl.trust-store-password</code>	A parameter to specify the password of the trust store file.	string	
<code>quarkus.grpc.server.ssl.cipher-suites</code>	The cipher suites to use. If none is given, a reasonable default is selected.	list of string	
<code>quarkus.grpc.server.ssl.protocols</code>	The list of protocols to explicitly enable.	list of string	TLSv1.3, TLSv1.2
<code>quarkus.grpc.server.ssl.client-auth</code>	Configures the engine to require/request client authentication. NONE, REQUEST, REQUIRED	none, request, required	none
<code>quarkus.grpc.server.plain-text</code>	Disables SSL, and uses plain text instead. If disabled, configure the ssl configuration.	boolean	true
<code>quarkus.grpc.server.alpn</code>	Whether ALPN should be used.	boolean	true
<code>quarkus.grpc.server.transport-security.certificate</code>	The path to the certificate file.	string	
<code>quarkus.grpc.server.transport-security.key</code>	The path to the private key file.	string	

<code>quarkus.grpc.server.enable-reflection-service</code>		
Enables the gRPC Reflection Service. By default, the reflection service is only exposed in <code>dev</code> mode. This setting allows overriding this choice and enable the reflection service every time.	boolean	<code>false</code>
<code>quarkus.grpc.server.instances</code>		
Number of gRPC server verticle instances. This is useful for scaling easily across multiple cores. The number should not exceed the amount of event loops.	int	<code>1</code>



#### About the Duration format

The format for durations uses the standard `java.time.Duration` format. You can learn more about it in the [Duration#parse\(\) javadoc](#).

You can also provide duration values starting with a number. In this case, if the value consists only of a number, the converter treats the value as seconds. Otherwise, `PT` is implicitly prepended to the value to obtain a standard `java.time.Duration` format.

## Example of configuration

### Enabling TLS

To enable TLS, use the following configuration:

```
quarkus.grpc.server.ssl.certificate=src/main/resources/tls/server.pem
quarkus.grpc.server.ssl.key=src/main/resources/tls/server.key
```



When SSL/TLS is configured, `plain-text` is automatically disabled.

### TLS with Mutual Auth

To use TLS with mutual authentication, use the following configuration:

```
quarkus.grpc.server.ssl.certificate=src/main/resources/tls/server.pem
quarkus.grpc.server.ssl.key=src/main/resources/tls/server.key
quarkus.grpc.server.ssl.trust-store=src/main/resources/tls/ca.jks
quarkus.grpc.server.ssl.trust-store-password=*****
quarkus.grpc.server.ssl.client-auth=REQUIRED
```