# Introduction to gRPC

@Microservice ID Meetup

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# gRPC

# gRPC Remote Procedure Calls

# Remote Procedure Call?

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**Implementing remote procedure calls**

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1984 Article


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Bibliometrics

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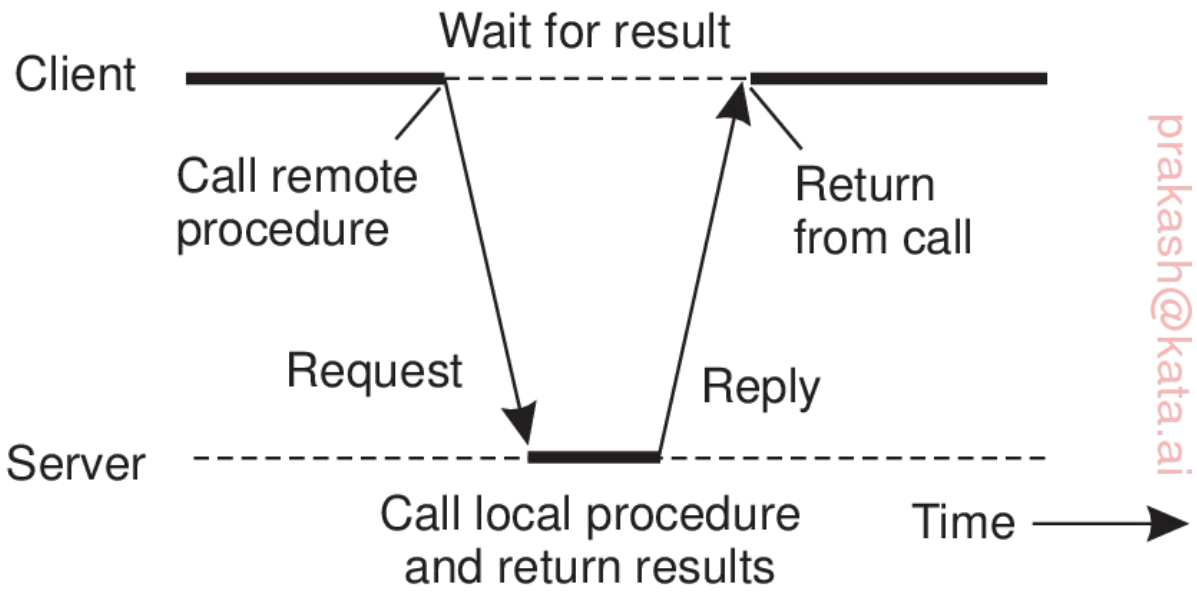
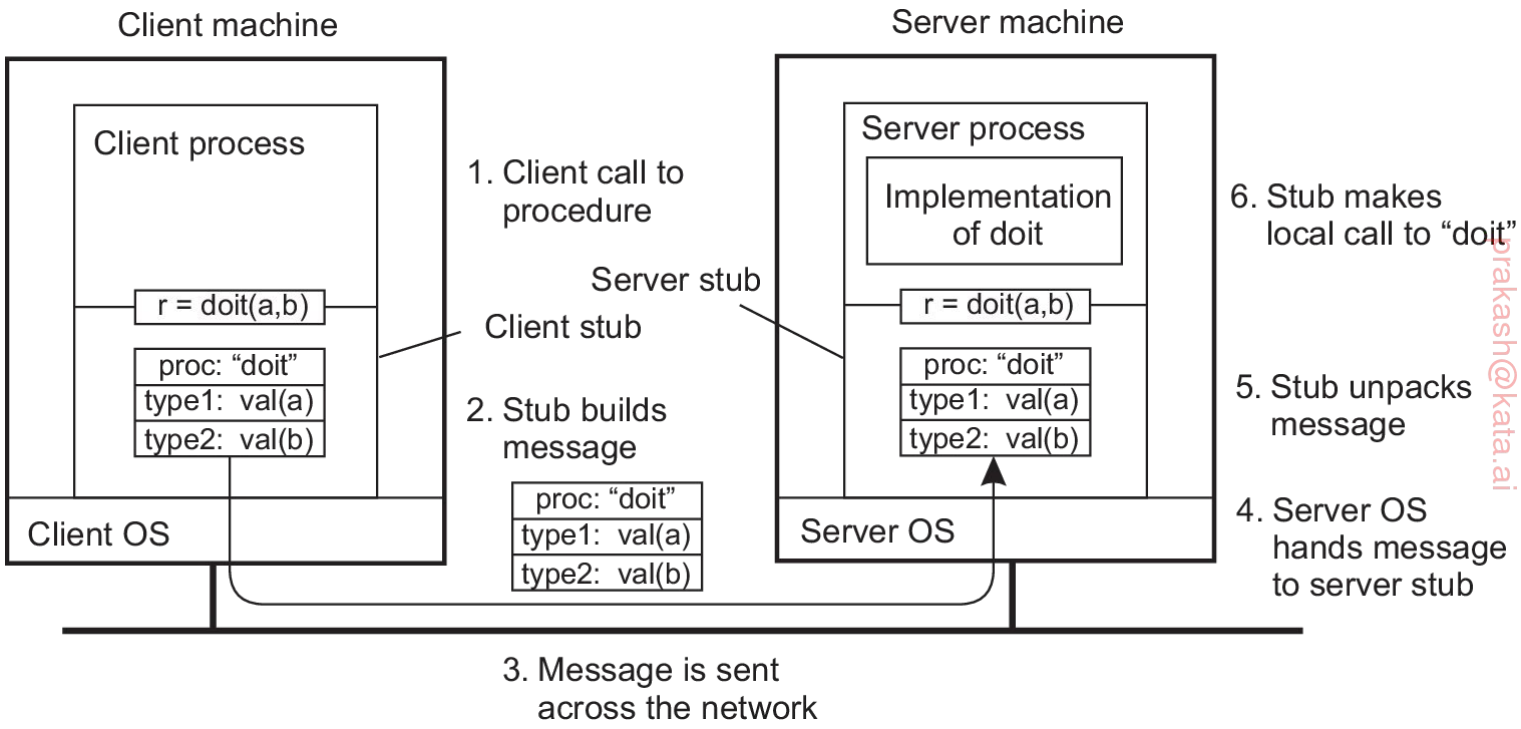
# In a Nutshell



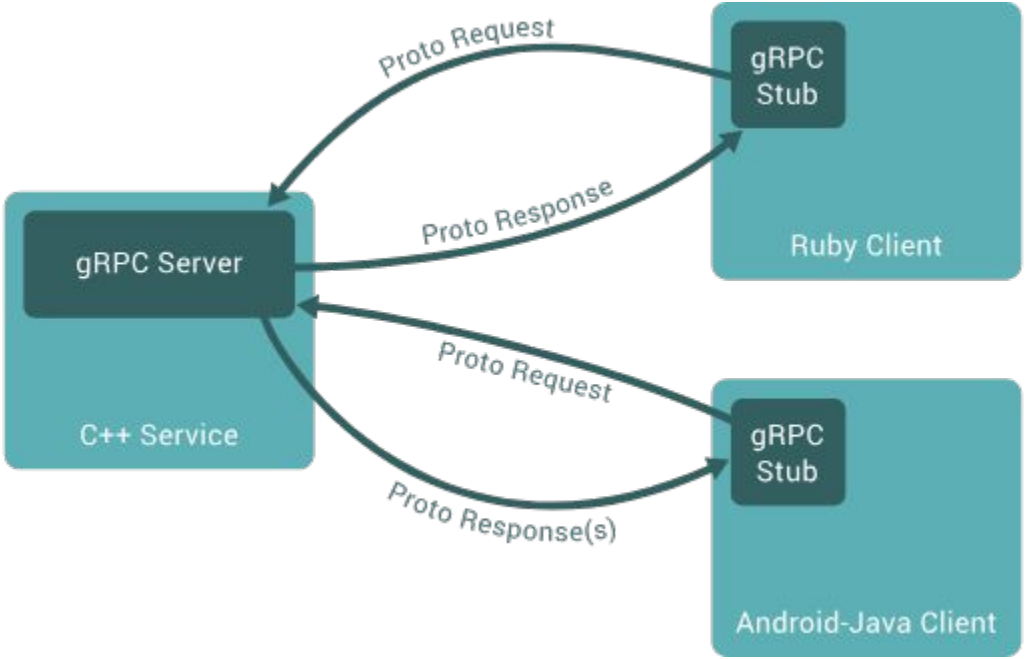
# More Complex



# About gRPC

- Stubby (Google's Internal RPC)
- March 2015, build the next version of Stubby
- Become part of Cloud Native Computing Foundation (CNCF) since 1 March 2017
- More info: https://cloud.google.com/blog/products/gcp/grpc-a-true-internet-scale-rpc-framework-is-now-1-and-ready-for-production-deployments?m=0

# How It Works?


Proto Request
gRPC Stub
Ruby Client
Proto Response
gRPC Server
C++ Service
Proto Request
gRPC Stub
Proto Response(s)
Android-Java Client

# Benefits

- Low Latency Using HTTP/2
- Efficient Serialization Using Protocol Buffer
- Multi-language Support
- Connection Options (unary, server streaming, client streaming, bi-directional streaming)

# HTTP/2

HTTP/2 vs HTTP/1.1 Demo:
http://www.http2demo.io/

Further reading:
https://www.cncf.io/blog/2018/08/31/grpc-on-http-2-engineering-a-robust-high-performance-protocol/

gRPC vs REST over HTTP/2:
https://stackoverflow.com/questions/44877606/is-grpchttp-2-faster-than-rest-with-http-2

# Protocol Buffers

- Google's mature open source mechanism for serializing structured data.
- Data structured as messages.
- Steps:
  a. Define the structure in a proto file.
  b. Using the protocol buffer compiler (protoc) to generate data access classes.
  c. With plugin can generated gRPC client and server.

```
syntax = "proto3";

package example;

service ExampleService {
    rpc SayHello(HelloRequest) returns (HelloResponse);
    rpc DoAddition(NumberRequest) returns (NumberResponse);
    rpc DoSubtraction(NumberRequest) returns (NumberResponse);
}

message HelloRequest {
    string greeting = 1;
}

message HelloResponse {
    string reply = 1;
}

message NumberRequest {
    int32 first_number = 1;
    int32 second_number = 2;
}

message NumberResponse {
    int32 result = 1;
}
```

# Protocol Buffers vs XML

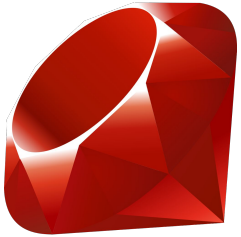
- Simpler
- 3 to 10 times smaller
- 20 to 100 times faster
- Less ambiguous
- Generate data access classes that are easier to use programmatically

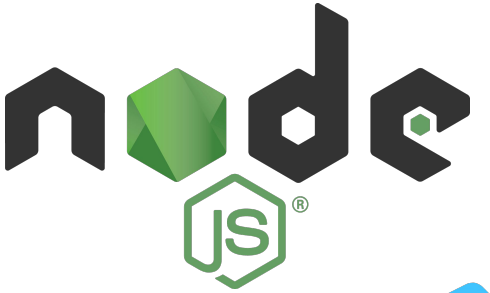
```
# Textual representation of a protocol buffer.
# This is *not* the binary format used on the wire.
person {
  name: "John Doe"
  email: "jdoe@example.com"
}
```

```
<person>
  <name>John Doe</name>
  <email>jdoe@example.com</email>
</person>
```

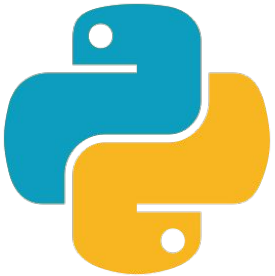
# Supported Language

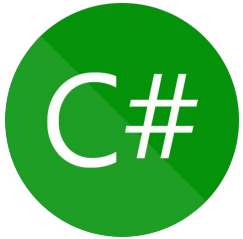










LET'S GET THIS PARTY STARTED!
imgflip.com

# Step 1: Create Proto

```
syntax = "proto3";

package example;

service ExampleService {
    rpc SayHello(HelloRequest) returns (HelloResponse);
    rpc DoAddition(NumberRequest) returns (NumberResponse);
    rpc DoSubtraction(NumberRequest) returns (NumberResponse);
}

message HelloRequest {
    string greeting = 1;
}

message HelloResponse {
    string reply = 1;
}

message NumberRequest {
    int32 first_number = 1;
    int32 second_number = 2;
}

message NumberResponse {
    int32 result = 1;
}
```

# Step 2: Generate Server and Client Stubs

```
protoc --proto_path=example --proto_path=../ --go_out=plugins=grpc:example example.proto
```

# Step 3: Create Server or Client

```go
package main

import (
  "fmt"
  "log"
    "net"

    "golang.org/x/net/context"
    "google.golang.org/grpc"
    "grpc-example/go/example"

)

type Server struct{}

// SayHello function implementation
func (s *Server) SayHello(context context.Context, in *example.HelloRequest) (*example.HelloResponse,
error) {
    return &example.HelloResponse{Reply: "Hello " + in.Greeting + "!"}, nil
}

// DoAddition function implementation
func (s *Server) DoAddition(context context.Context, in *example.NumberRequest)
(*example.NumberResponse, error) {
    return &example.NumberResponse{Result: in.FirstNumber + in.SecondNumber}, nil
}

// DoSubtraction function implementation
func (s *Server) DoSubtraction(context context.Context, in *example.NumberRequest)
(*example.NumberResponse, error) {
    return &example.NumberResponse{Result: in.FirstNumber - in.SecondNumber}, nil
}

func main() {
    // create a listener on TCP port 50050
    lis, err := net.Listen("tcp", fmt.Sprintf(":%d", 50050))
    if err != nil {
      log.Fatalf("failed to listen: %v", err)
    }

    // create a gRPC server object
    grpcServer := grpc.NewServer()
    // attach the Ping service to the server
    example.RegisterExampleServiceServer(grpcServer, &Server{})

    // start the server
    if err := grpcServer.Serve(lis); err != nil {
      log.Fatalf("failed to serve: %s", err)
    }
}
```

```go
package main

import (
    "log"

    "golang.org/x/net/context"
    "google.golang.org/grpc"
    "grpc-example/go/example"

)

func main() {
    conn, err := grpc.Dial(":50050", grpc.WithInsecure())
    if err != nil {
        log.Fatalf("did not connect: %s", err)
    }
    defer conn.Close()

    c:= example.NewExampleServiceClient(conn)

    responseHello, err := c.SayHello(context.Background(), &example.HelloRequest{Greeting: "Prakash"})

    if err != nil {
        log.Fatalf("Error when calling SayHello: %s", err)
    }

    log.Printf("Response from server: %s", responseHello.Reply)

    responseAddition, err := c.DoAddition(context.Background(), &example.NumberRequest{FirstNumber: 1,
SecondNumber: 2})

    if err != nil {
        log.Fatalf("Error when calling DoAddition: %s", err)
    }

    log.Printf("Response from server: %d", responseAddition.Result)

    responseSubtraction, err := c.DoSubtraction(context.Background(),
&example.NumberRequest{FirstNumber: 1, SecondNumber: 2})

    if err != nil {
        log.Fatalf("Error when calling DoSubtraction: %s", err)
    }

    log.Printf("Response from server: %d", responseSubtraction.Result)
}
```

# Step 4: Running Server or Client

# Demo

https://github.com/prakashdivyy/grpc-example

# Further Reading

- https://grpc.io/docs/guides/
- https://developers.google.com/protocol-buffers/docs/overview
- https://grpc.io/docs/guides/concepts/
- https://www.slideshare.net/Codemotion/introduction-to-grpc-a-general-rpc-framework-that-puts-mobile-and-http2-first-mete-atamel-codemotion-amsterdam-2017

FIN!