JSON RPC

with C++ static reflection

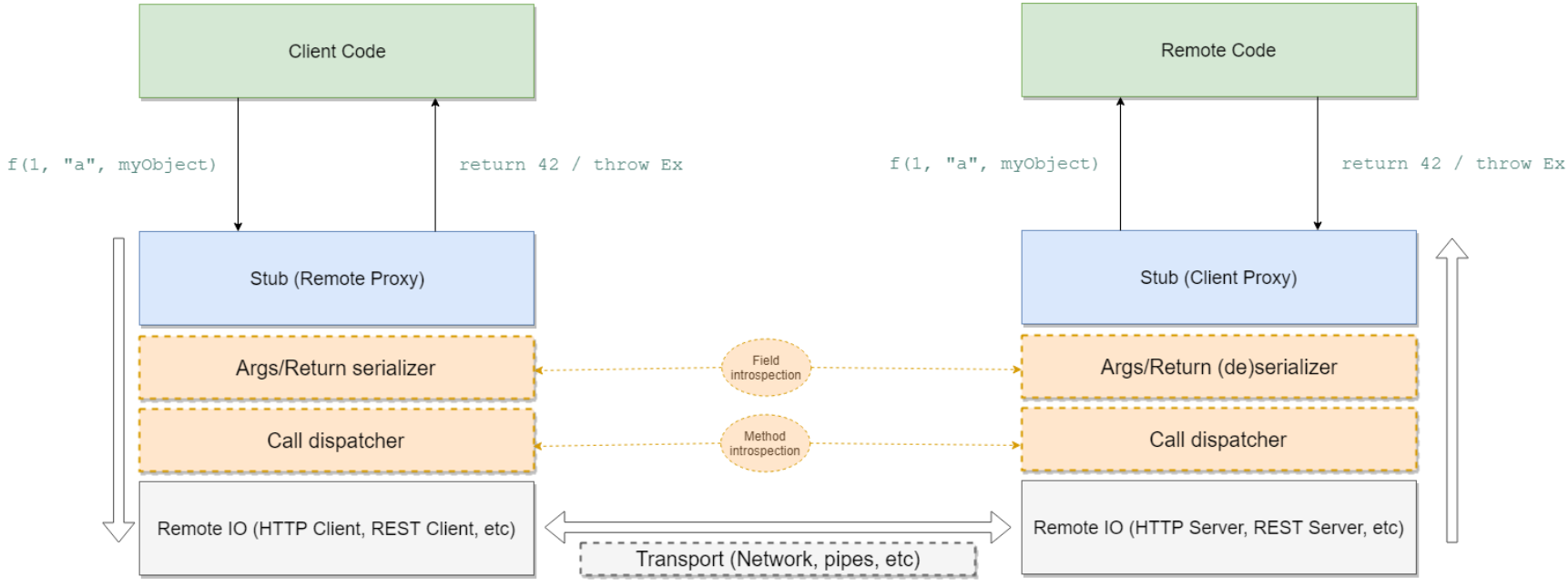
RPC?

- "*Remote Procedure Call*"
- Transparent invocation of remote APIs
- Just a *call* to a function

RPC key concepts

- Client vs Server / Sender vs Receiver
- Call serialization scheme
- Call routing / dispatching

RPC key concepts



RPC examples

- SOAP
- gRPC (Google RPC)
- Qt Remote Objects
- **JSON-RPC**

(Simple) JSON-RPC

- Function name as TCP/REST endpoint route
- Call args encoded as JSON object **with ordered array of args**
- Result encoded as JSON object with result/error field

JSON-RPC server

- Pistache (http://pistache.io/)
- Both TCP/REST client and **server** available
- Support for async request processing
- Fast, easy to use

Pistache REST server

```
Pistache::Http::Endpoint endpoint{"127.0.0.1"};
Pistache::Rest::Router router;

// Fill routes here...

endpoint.setHandler(router.handler());
endpoint.serve(); // Tah dah!
```

Pistache REST routes

```
using namespace Pistache::Rest;

Routes::Post(router, "/method1",
    Routes::bind(&Class::method1, &classInstance))
```

(Automagic) Pistache REST routes

```
tinyrefl::visit_member_functions<Class>([&obj](
    const std::string& name,
    const auto method) {
  Routes::Post("/" + name, Routes::bind(method, &obj));
}
```

Well...

- Pistache route callbacks have a fixed signature

```
void myRouteHandler(
  const Pistache::Http::Request& req,
  Pistache::Http::ResponseWriter& res) {
    res.write(Pistache::Http::Ok);
}
```

(Automagic) Pistache REST routes, again

```
tinyrefl::visit_member_functions<Class>([&obj](
    const std::string& name,
    const auto method) {

  Routes::Post("/" + name, [&obj, method](
    const Request& req,
    ResponseWriter& res) {
      handleCall(obj, method, req, res);
    });
}
```

```
template<typename Class, typename Method>
void handleCall(
    Class& obj,
    const Method method,
    const Request& req,
    ResponseWriter& res) {

  auto call = [&obj](auto&&... args) {
    return (obj.*method)(args...);
  }

  auto tuple_of_args = deserialize_call_args(
    method, req.body());

  try {
    const auto result = std::apply(call, tuple_of_args);
    res.body().write(serialize(result));
  } catch(const std::exception& ex) {
    res.body().write(
      fmt::format("{{\"error\": \"{}\"}}", ex.what()));
  }
}
```

```
template<typename R, typename Class, typename... Args>
auto deserialize_call_args(
    R(Class::*method)(Args...),
    const std::string& body) {\

  const auto json_body = nlohmann::json::parse(body);

  std::tuple<std::decay_t<Args>...> args;

  tinyrefl::meta::foreach<std::decay_t<Args>...>(
    [&](auto type, auto index) {
      using Type = typename decltype(type)::type;
      using Index = decltype(index);

      std::get<Index::value>(args) =
        json_body["args"][Index::value].get<Type>();
  });

  return args;
}
```

QA?

- https://github.com/Manu343726/tinyrefl
- https://github.com/madridccppug/meetups
- "Que es el movimiento de semantica?"