WebSocket Cheat Sheet

API Technologies · Quick Reference

OVERVIEW

WebSocket API style/protocol for service communication
Key principles and design philosophy
Compare to REST, SOAP, GraphQL alternatives

```
# Typical request
curl -X POST
https://api.example.com/graphql \
-H 'Content-Type: application/json' \
-d '{"query": "{ users { id name } }"}'
```

CORE CONCEPTS

Schema: defines types, queries, mutations
Operations: Query (read), Mutation (write), Subscription (real-time)
Resolver: function that returns data for a field

```
# Schema example:
type User { id: ID!, name: String!,
email: String! }
type Query { user(id: ID!): User, users:
[User!]! }
```

SETUP & SERVER

```
npm install apollo-server graphql
const { ApolloServer } =
require('@apollo/server')
const server = new ApolloServer({
typeDefs, resolvers })
await server.listen({ port: 4000 })
# GraphQL Playground at
http://localhost:4000
```

QUERIES & MUTATIONS

```
# Query
query { user(id: "1") { name email } }
# Mutation
mutation { createUser(name: "Alice",
email: "a@b.com") { id } }
# Variables
query GetUser($id: ID!) { user(id: $id)
{ name } }
{ "id": "123" }
```

RESOLVERS

```
const resolvers = {
Query: {
user: (_, { id }, ctx) =>
ctx.db.users.findById(id),
users: (_, __, ctx) =>
ctx.db.users.findAll(),
},
Mutation: {
createUser: (_, args, ctx) =>
ctx.db.users.create(args),
},
}
```

AUTH & SECURITY

Add auth in context or middleware

```
const server = new ApolloServer({
context: async ({ req }) => ({
user: await
authenticate(req.headers.authorization),
db,
}),
})
```

Validate and sanitize all inputs
Rate limit and depth-limit queries

ERROR HANDLING

```
throw new UserInputError('Invalid
input', { field: 'email' })
throw new AuthenticationError('Not
authenticated')
throw new ForbiddenError('Not
authorized')
```

Errors returned in errors[] array alongside data
Use formatError to sanitize error messages in production

PERFORMANCE

N+1 problem: use DataLoader for batching

```
const userLoader = new DataLoader(ids =>
batchLoadUsers(ids))
Query.user = (_, { id }) =>
userLoader.load(id)
```

Persisted queries: cache query document hash
Response caching: @cacheControl directive
Field-level tracing for performance analysis

TOOLING

```
GraphQL Playground / Apollo Studio
interactive IDE
graphql-codegen    generate types from
schema
graphql-inspector  schema
diff/validation
Apollo Client      frontend integration
urql               lightweight GraphQL
client
graphql-shield     permission layer
```

TESTING

```
# Apollo Server integration test
const { query } =
createTestClient(server)
const { data } = await query({ query:
GET_USER, variables: { id: '1' } })
expect(data.user.name).toBe('Alice')
```

Test resolvers in isolation with mock context
Use Jest or Vitest as test runner

COMMON GOTCHAS

N+1 queries: always use DataLoader for relations
Query depth limiting: prevent DoS attacks
Don't expose internal error details in production
Schema-first vs code-first: choose one approach
Subscriptions need separate WebSocket transport setup