

Hexagonal Architecture

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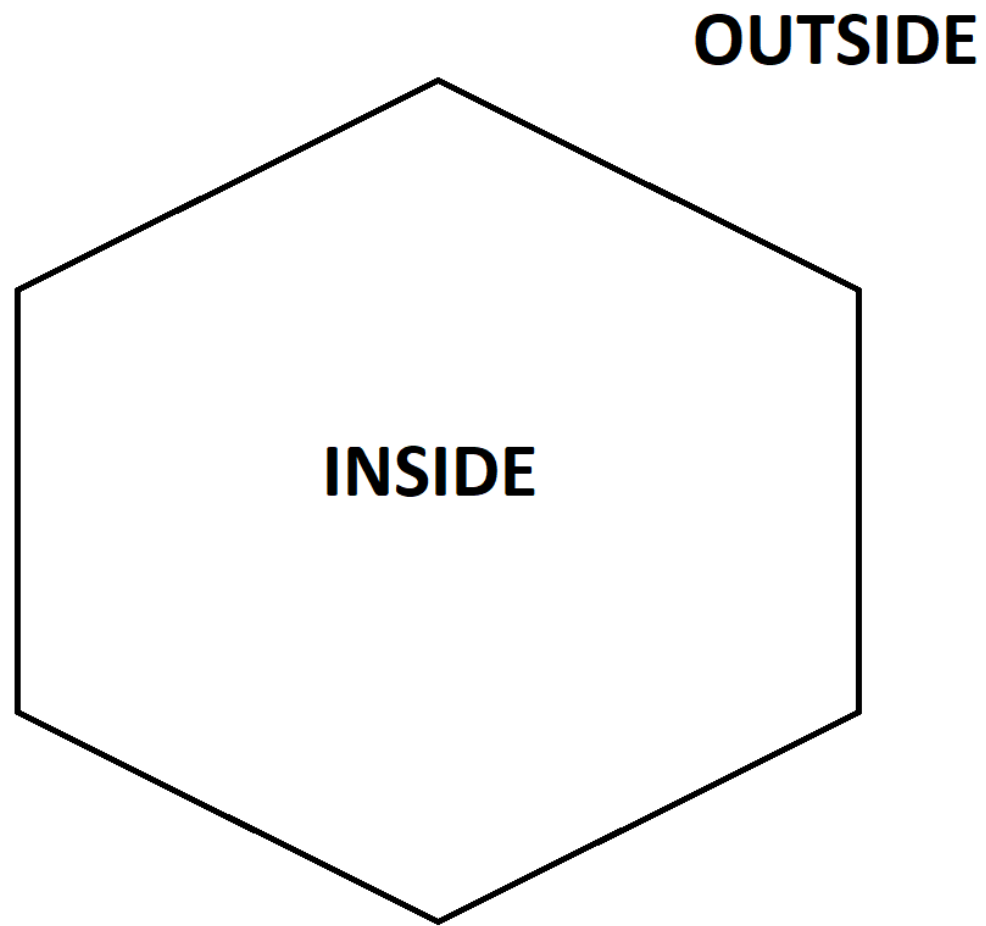
Sometimes we have



And sometimes we have



Hexagon





Hexagonal architecture aka Ports & Adapters

Inside

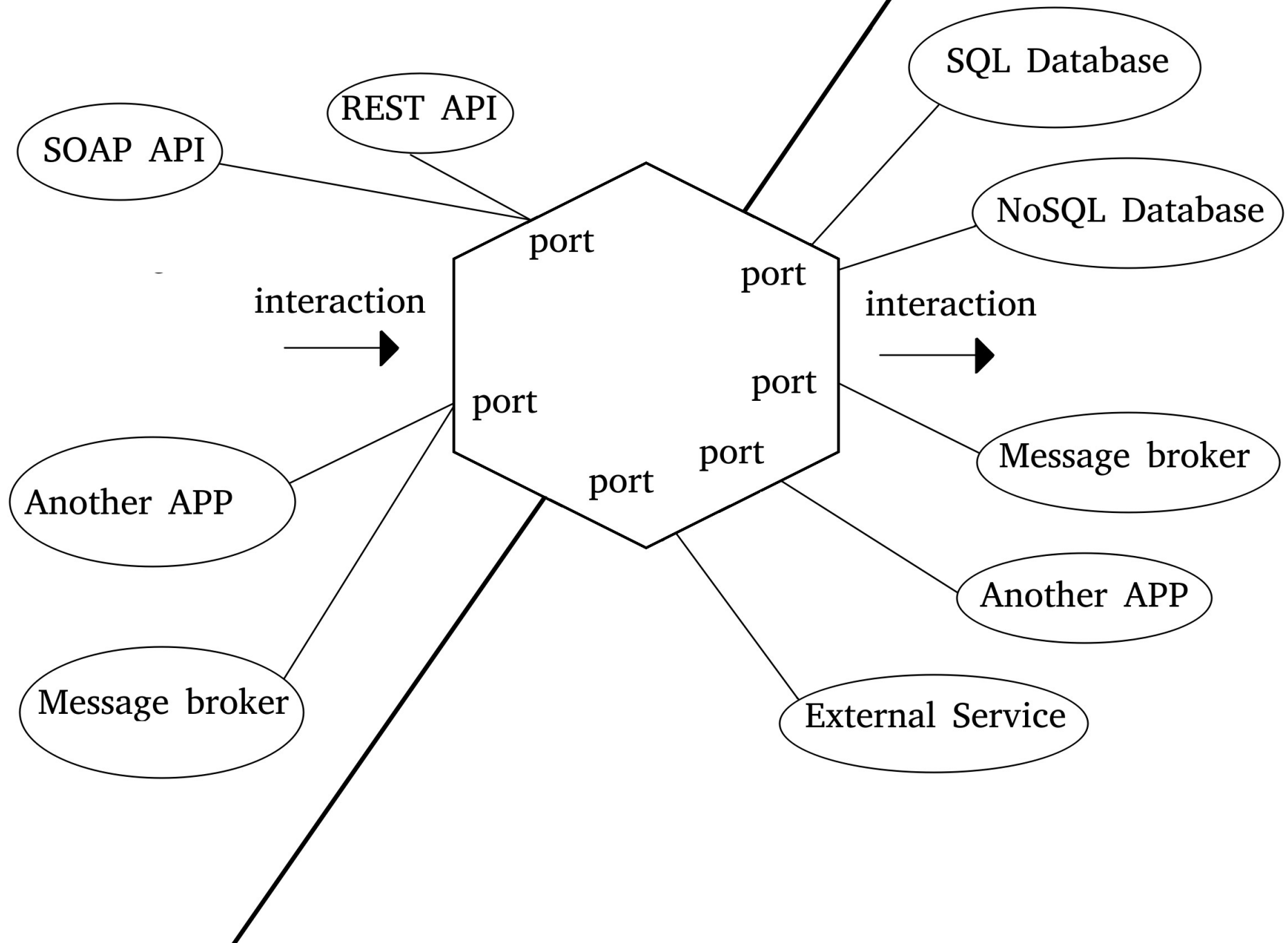
- **Domain**
- **Contracts (aka Ports)**
- Technology agnostic
- High isolation

Outside

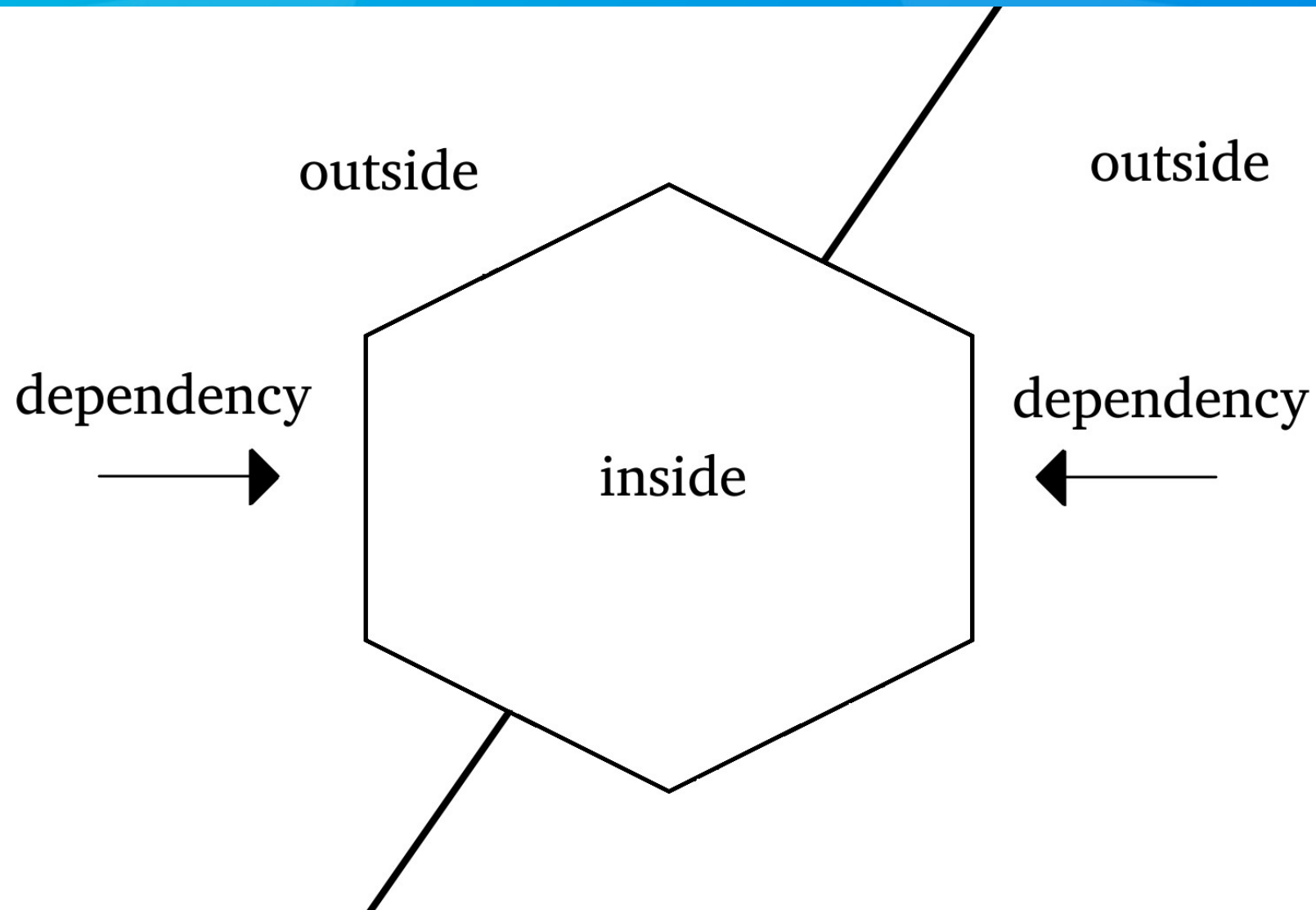
- **Contracts implementations (aka Adapters)**
- Framework
- Environment
- Users
- Another hexagon?

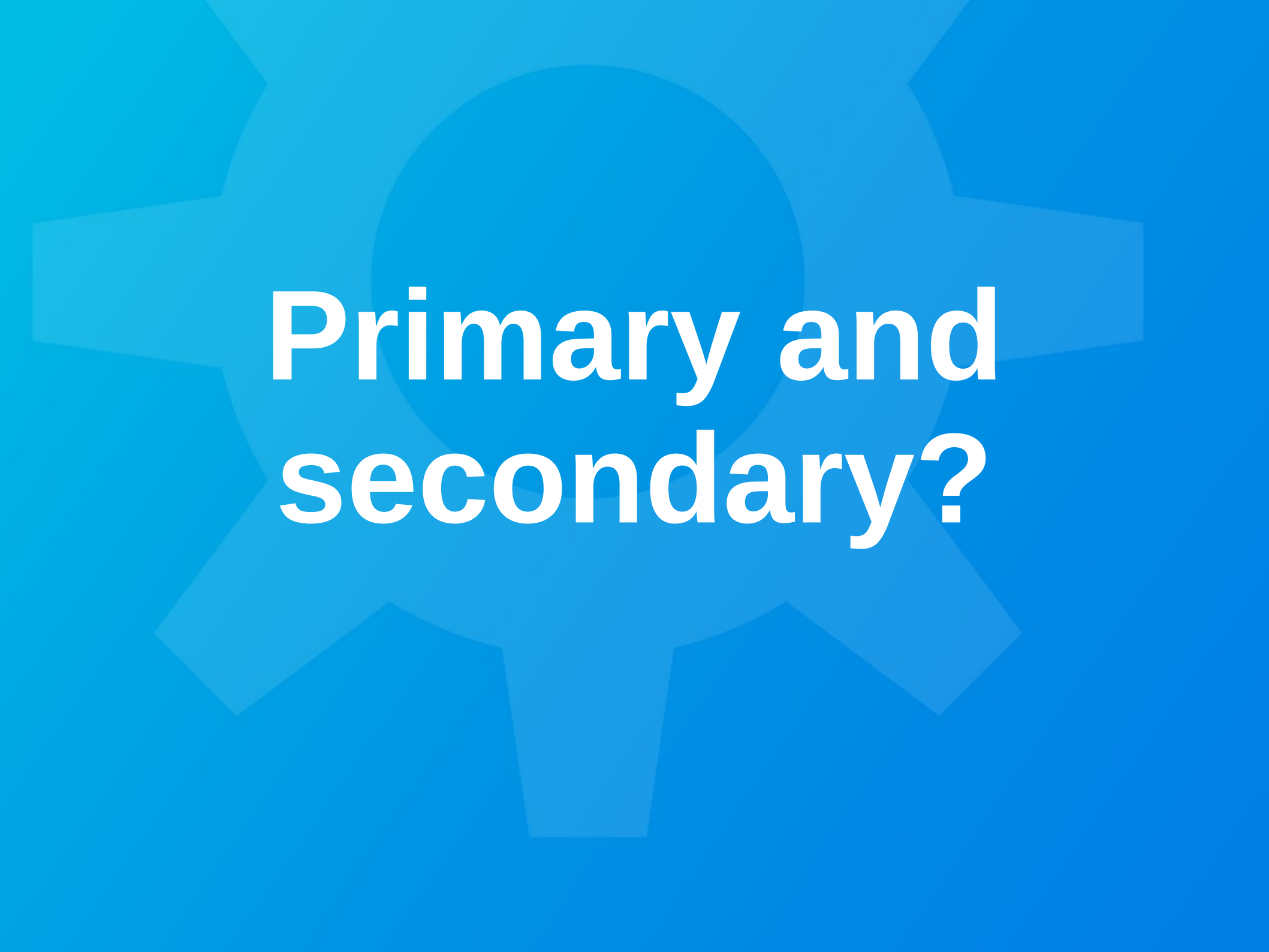
PRIMARY

SECONDARY



Dependency



A large, faint gear icon is centered in the background of the slide. The gear is a light blue color, matching the background, and has a circular center with eight teeth. The text "Primary and secondary?" is overlaid on the gear.

**Primary and
secondary?**

A large, stylized blue gear is centered on a solid blue background. The gear has eight teeth. In the center of the gear is a solid blue circle. Overlaid on this circle is the word "Port" in a white, bold, sans-serif font.

Port

Port

- **Contract**
- Defines how we can communicate with our domain (**primary**)
- Defines what our domain wants from the outside world (**secondary**)
- Should be named after interaction, not by a technology behind
- Belongs to the domain

Primary port example

```
public interface PrimaryDomainPort {  
    Person create(Person person);  
    Person get(PersonId personId);  
    PersonListProjection findAllByStreet(Street street);  
}
```

Secondary port example

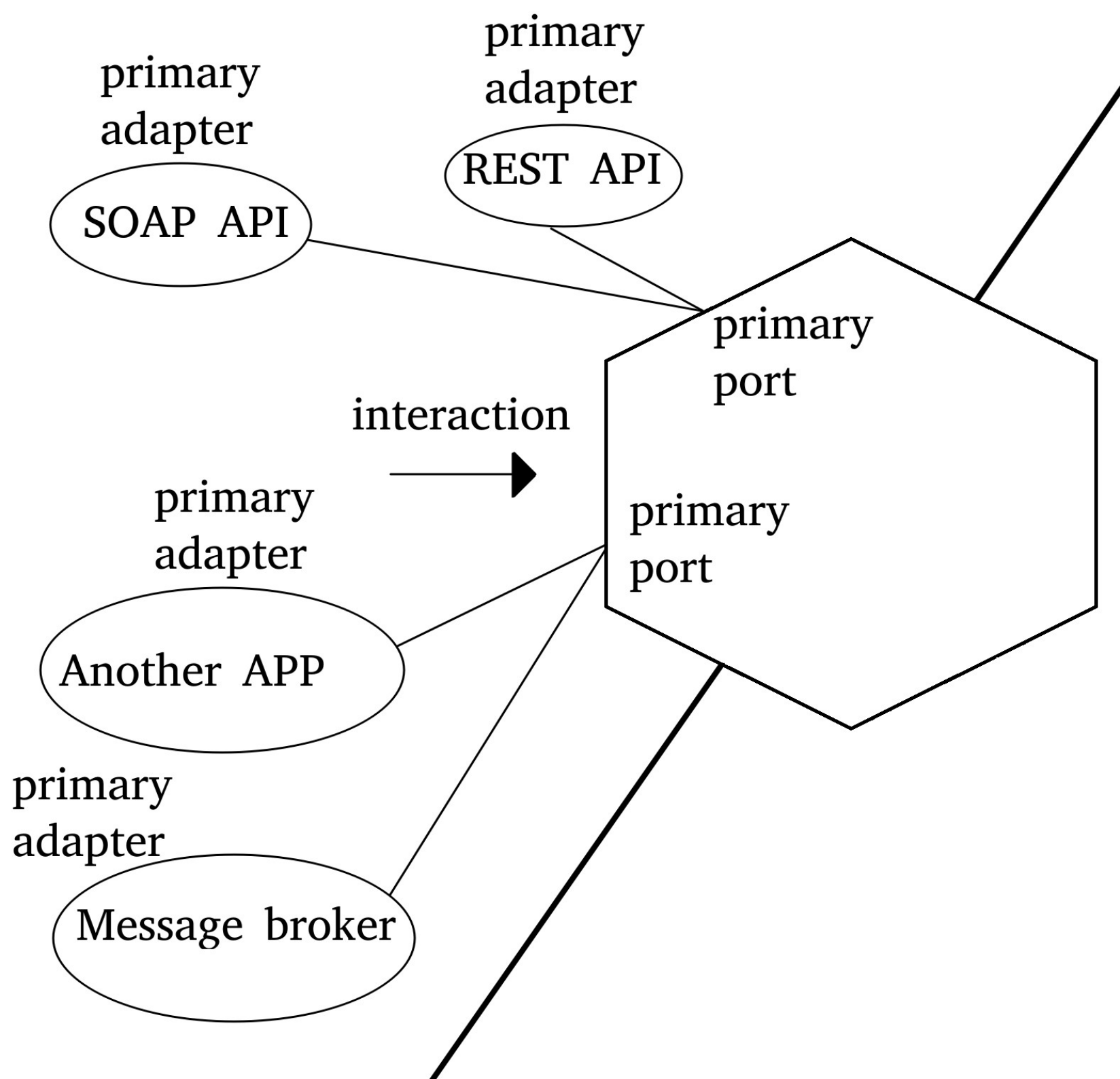
```
public interface PersonRepository {  
    Person create(Person person);  
    void update(PersonId personId, Person person);  
    Person findById(PersonId personId);  
}
```

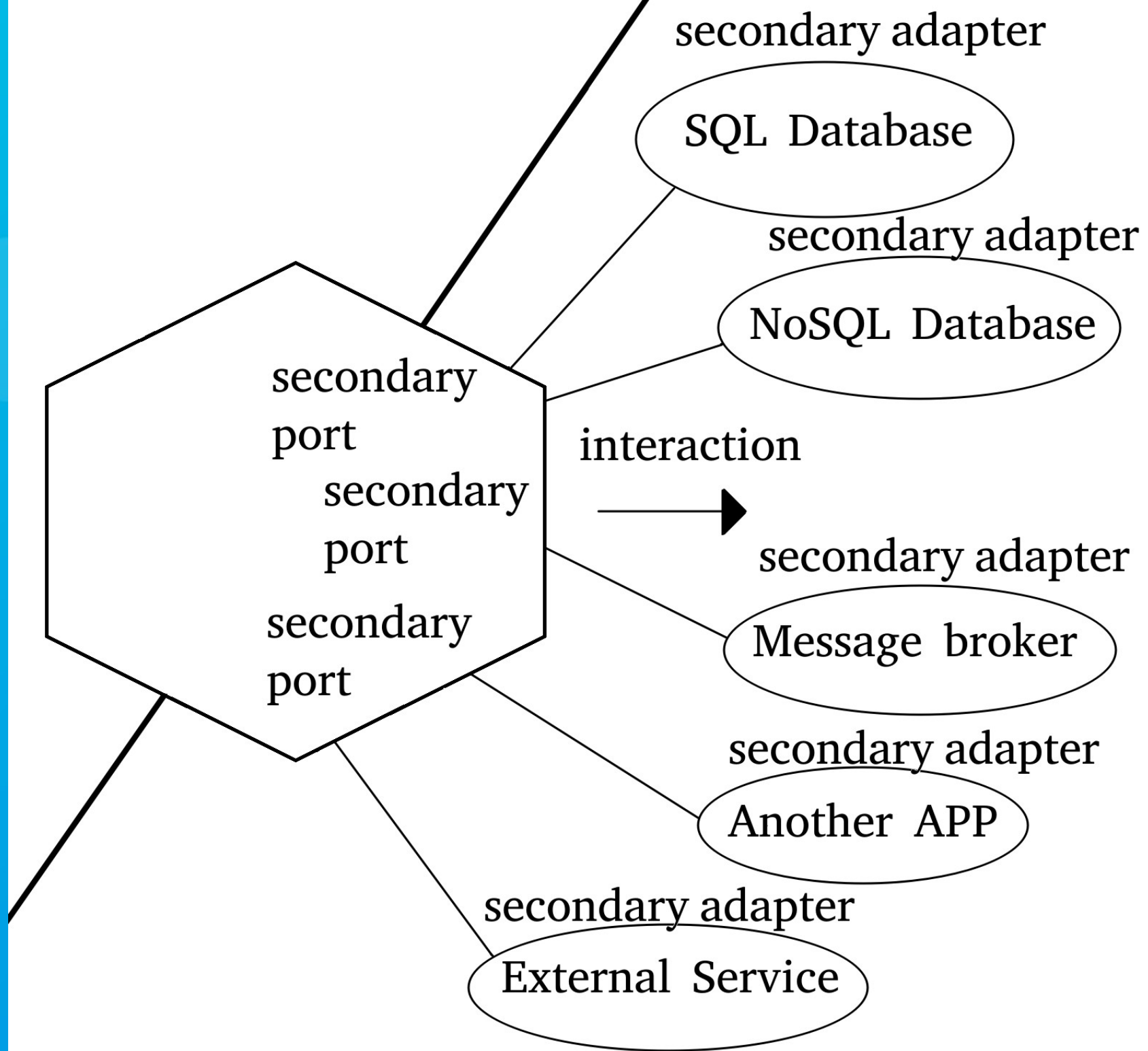



Adapter

Adapter

- **Contract's implementation**
- Translating technology request to agnostic request which can communicate with hexagon port (**primary**)
- Translating technology agnostic methods of the port to technology specific request (**secondary**)
- Belongs to outside world





The background features a solid blue field. In the center is a large, semi-transparent blue circle. Surrounding this circle is a larger, semi-transparent blue gear-like shape with eight teeth. The text is centered over the circle and gear.

**Main component
aka
Composition Root**



**Let's create
hexagonal
application!
Recipe**

1. Define what your domain will do – you will have your primary port (or ports)

```
public interface PrimaryDomainPort {  
    Person create(Person person);  
    Person get(PersonId personId);  
    PersonListProjection findAllByStreet(Street street);  
}
```

2. Define what your domain want – you will have your secondary ports (or one port)

```
public interface PersonRepository {  
    Person create(Person person);  
    void update(PersonId personId, Person person);  
    Person findById(PersonId personId);  
}
```


3. For each secondary port provide mock adapter

```
class PersonInMemoryRepository implements PersonRepository {  
    private final Map<PersonId, Person> database;  
  
    PersonInMemoryRepository() {  
        this.database = new HashMap<>();  
    }  
  
    @Override  
    public Person create(Person person) {  
        PersonId personId = PersonId.generate();  
        database.put(personId, person);  
        return Person.withId(personId, person);  
    }  
  
    @Override  
    public void update(PersonId personId, Person person) {  
        database.put(personId, person);  
    }  
  
    @Override  
    public Person findById(PersonId personId) {  
        return database.get(personId);  
    }  
}
```

4. Use BDD/TDD to create your domain implementation with help of your mocked adapters

```
@Test
public void personCreationWithNullNameShouldCauseException() {
    PrimaryDomainPort domain = new Domain(PersonRepositoryConfiguration.inMemoryDatabase());
    Person person = new Person( name: null);
    try {
        domain.create(person);
        fail();
    } catch (ValidationException ex) {
        // fine
    }
}

@Test
public void personCreationShouldGenerateNewId() {
    PrimaryDomainPort domain = new Domain(PersonRepositoryConfiguration.inMemoryDatabase());
    Person model = new Person( name: "Mateusz");

    Person firstPerson = domain.create(model);
    Person secondPerson = domain.create(model);

    assertNotEquals(firstPerson.getId(), secondPerson.getId());
}
```

5. Create real secondary adapters (create some unit/integration tests for them)

```
class PersonMySQLRepository implements PersonRepository {  
    private DatabaseConnection databaseConnection;  
  
    PersonMySQLRepository(DatabaseProperties properties) {  
        this.databaseConnection = DatabaseConnection.connect(properties);  
    }  
  
    @Override  
    public Person create(Person person) {  
        OrmPerson ormPerson = OrmMapper.map(person);  
        databaseConnection.insert(ormPerson);  
        return OrmMapper.map(ormPerson);  
    }  
}
```

6. Create primary adapters

```
@RestController
class RestAdapter {

    private PrimaryDomainPort domain;
    private AccessAdapter access;

    @Autowired
    public RestAdapter(PrimaryDomainPort domain, AccessAdapter access) {
        this.domain = domain;
        this.access = access;
    }

    @GetMapping("/person/{personId}")
    public PersonRestProjection getPerson(@PathVariable UUID personId) {
        access.checkAccess(personId);

        Person person = domain.get(PersonId.fromUuid(personId));
        return PersonRestProjection.from(person);
    }
}
```



Benefits of hexagonal architecture?



Testability!

The background features a solid blue color with a faint, larger gear pattern. In the center, there is a darker blue circle. Overlaid on this is the text in white, bold, sans-serif font.

**Higher
Maintainability
And
Lower Technical
Debt**



High domain isolation




Flexibility



Downsides of hexagonal architecture?



Additional abstractions and complexity



**Sometimes we
lose framework
power**

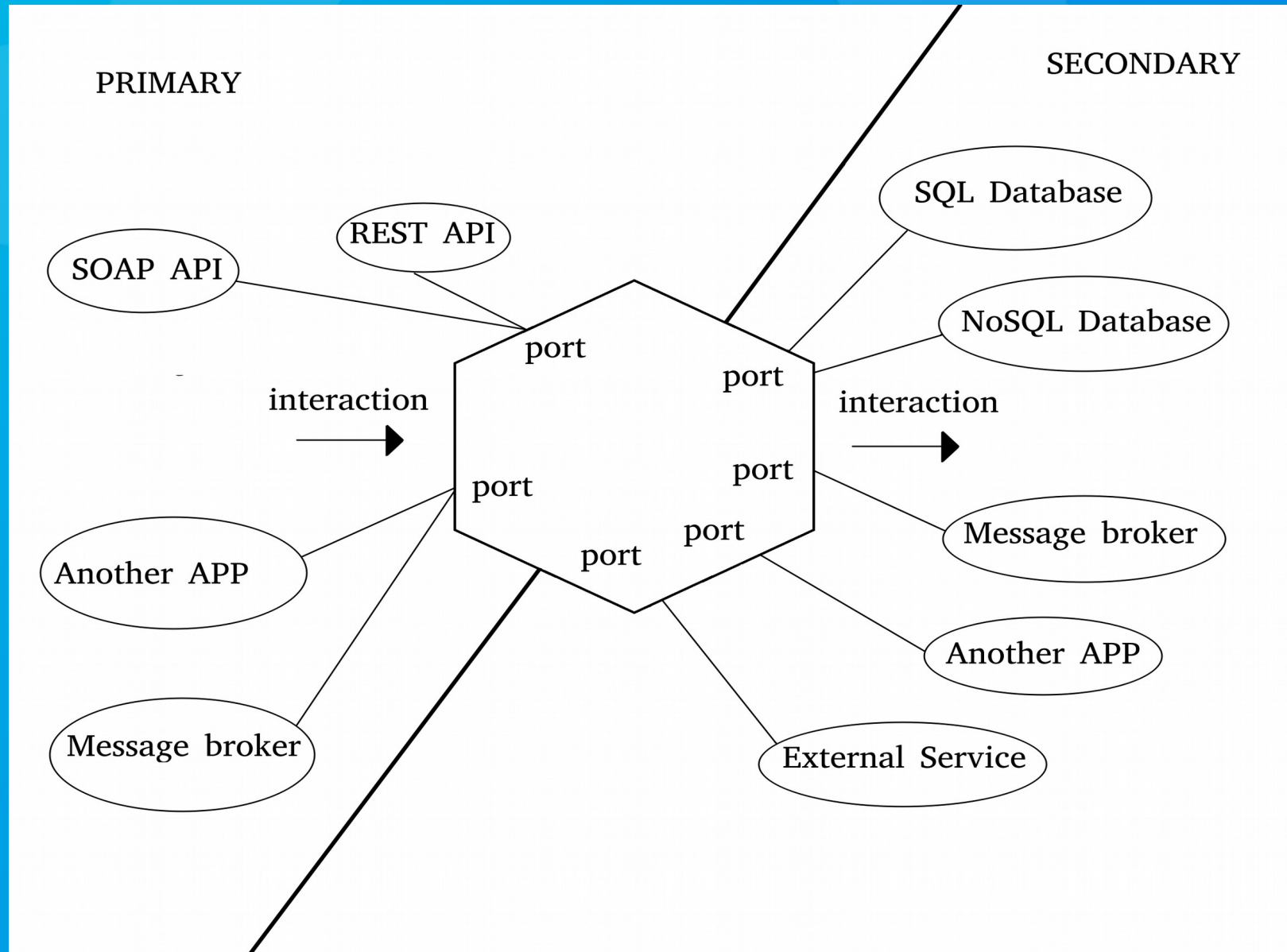
Possible questions and misconceptions

- Is it still layers?
- Can I produce a big ball of mud anyway?
- Why is it named hexagonal architecture?
- Where is port where is adapter?



**When to go
hexagonal?**

Q&A





Give me some feedback :)

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