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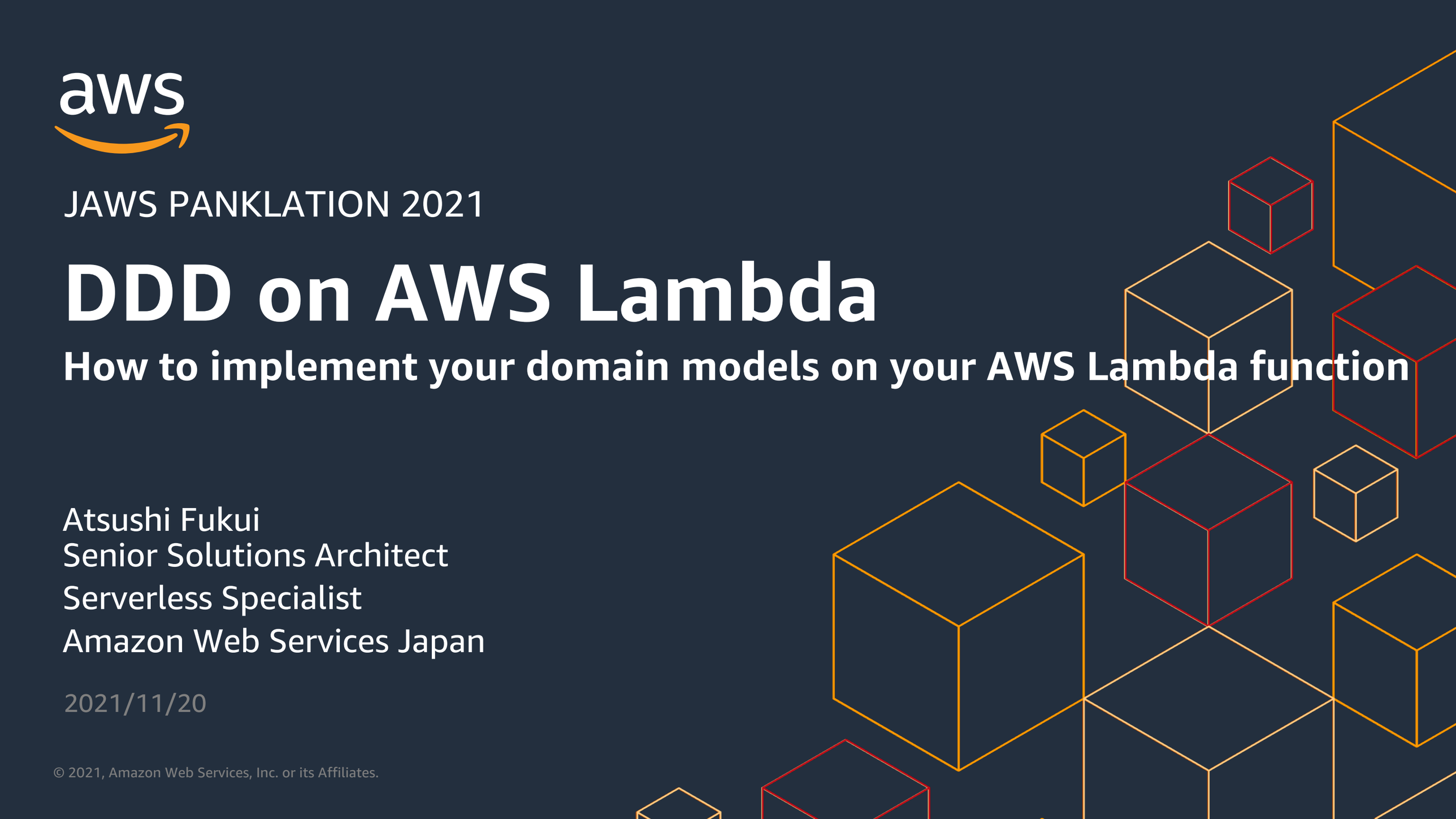

JAWS PANKLATION 2021

DDD on AWS Lambda

How to implement your domain models on your AWS Lambda function

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Who am I

- Name
  - Atsushi Fukui / twitter: afukui@
- Role and company
  - Senior Solutions Architect Serverless Specialist
  - Amazon Web Services Japan
- Interests
  - Software Architecture, Object Oriented Design and programming, Agile Development process
- My favorite AWS Services
  - AWS Lambda, AWS Step SQS and other all serverless services

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Agenda

- Domain Driven Design (DDD)
- Hexagonal Architecture
- Domain models for sample application
- How to implement unit testing code
- Demo
- Conclusion

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Domain-driven design

- Provides a broad framework for making design decisions and developing a technical vocabulary for discussing domain design
- Ubiquitous language - modeling the language of the business
- Provides guidance about tactical design - model domains with entities, value objects, repositories and services, and strategic design…

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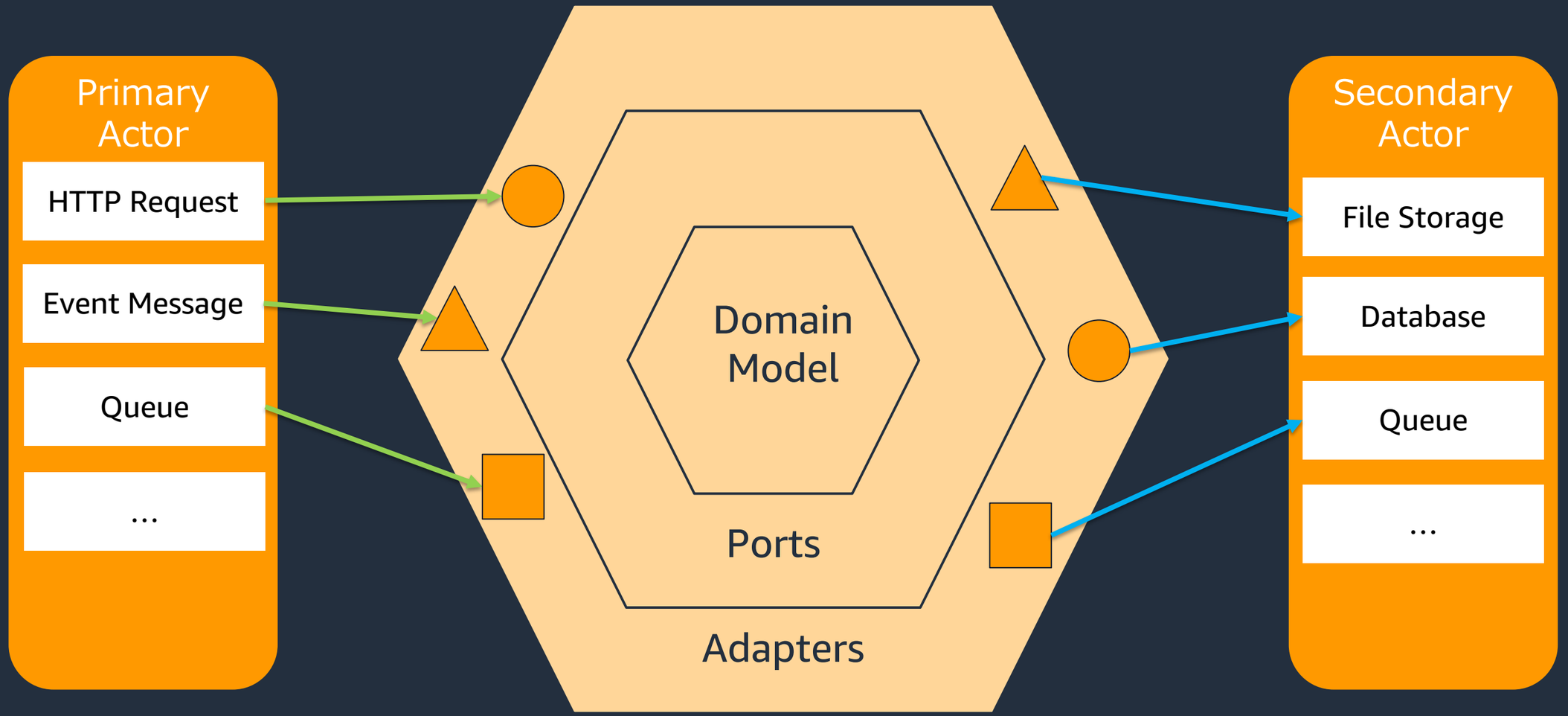
Hexagonal architecture



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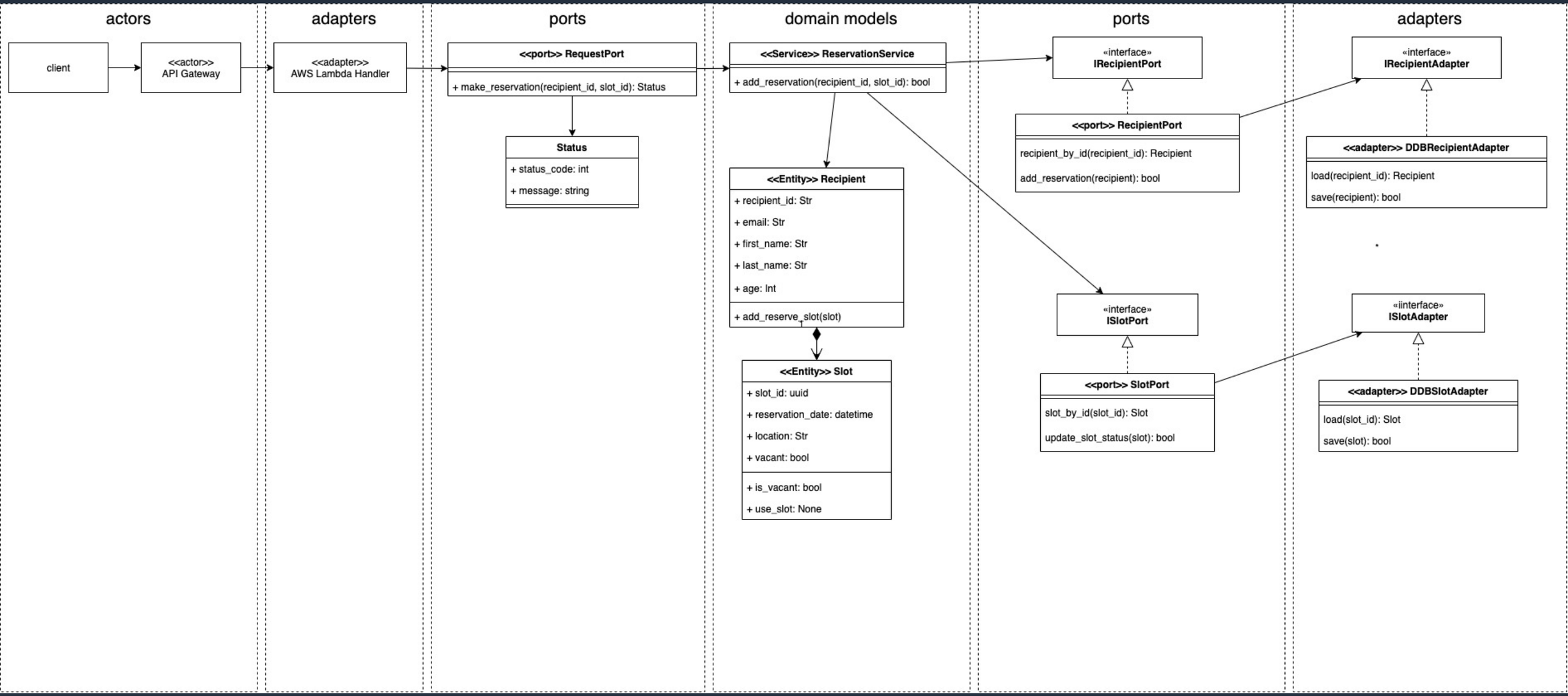
Sample Senario

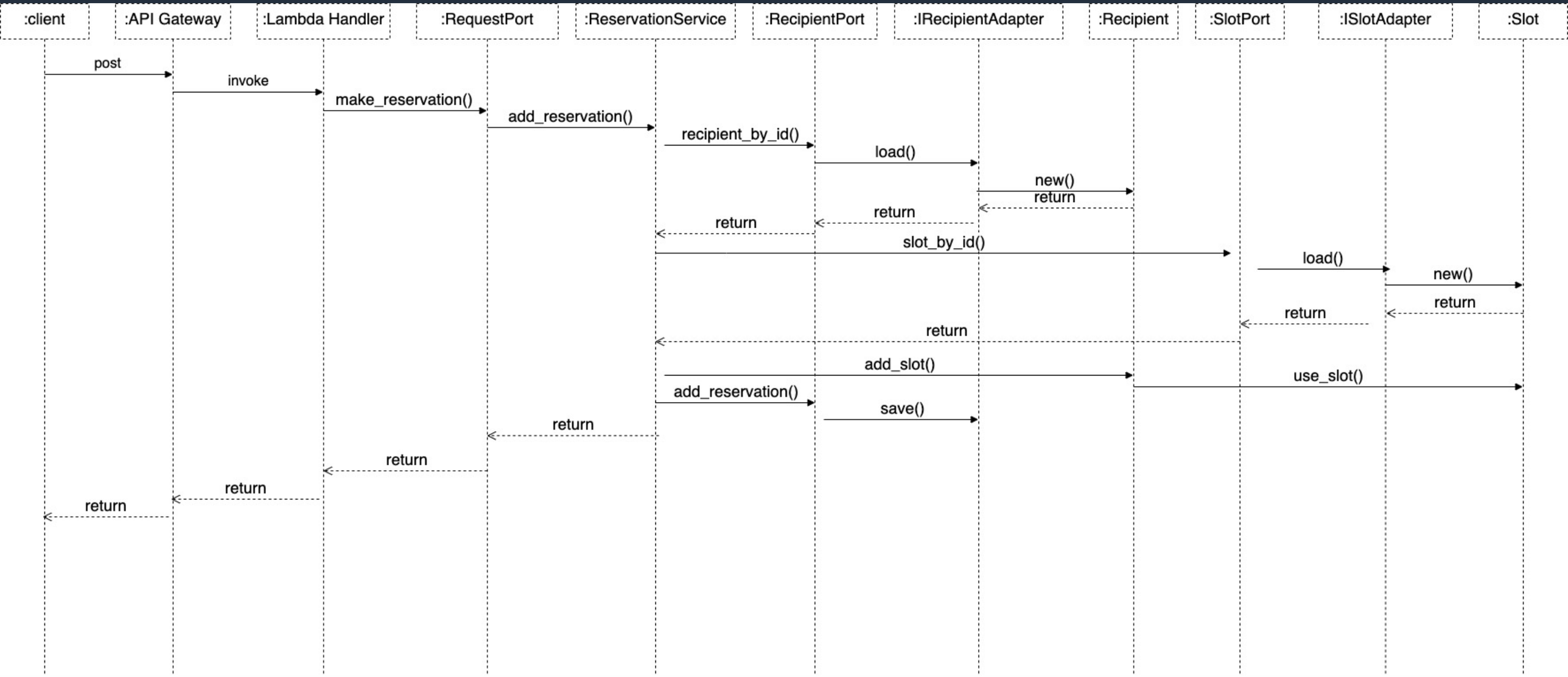
- Vaccination reservation system
  - Use cases:
    - A recipient can search for some vacant slots and register a reservation slot for vaccination reservation.
    - A recipient cannot register her reservation if there is no vacant slot.
    - A recipient cannot reserve her reservations more than two slots.
    - A recipient cannot reserve two reservations if there are same date time.

There are pure business logics you need to implement on your domain model.

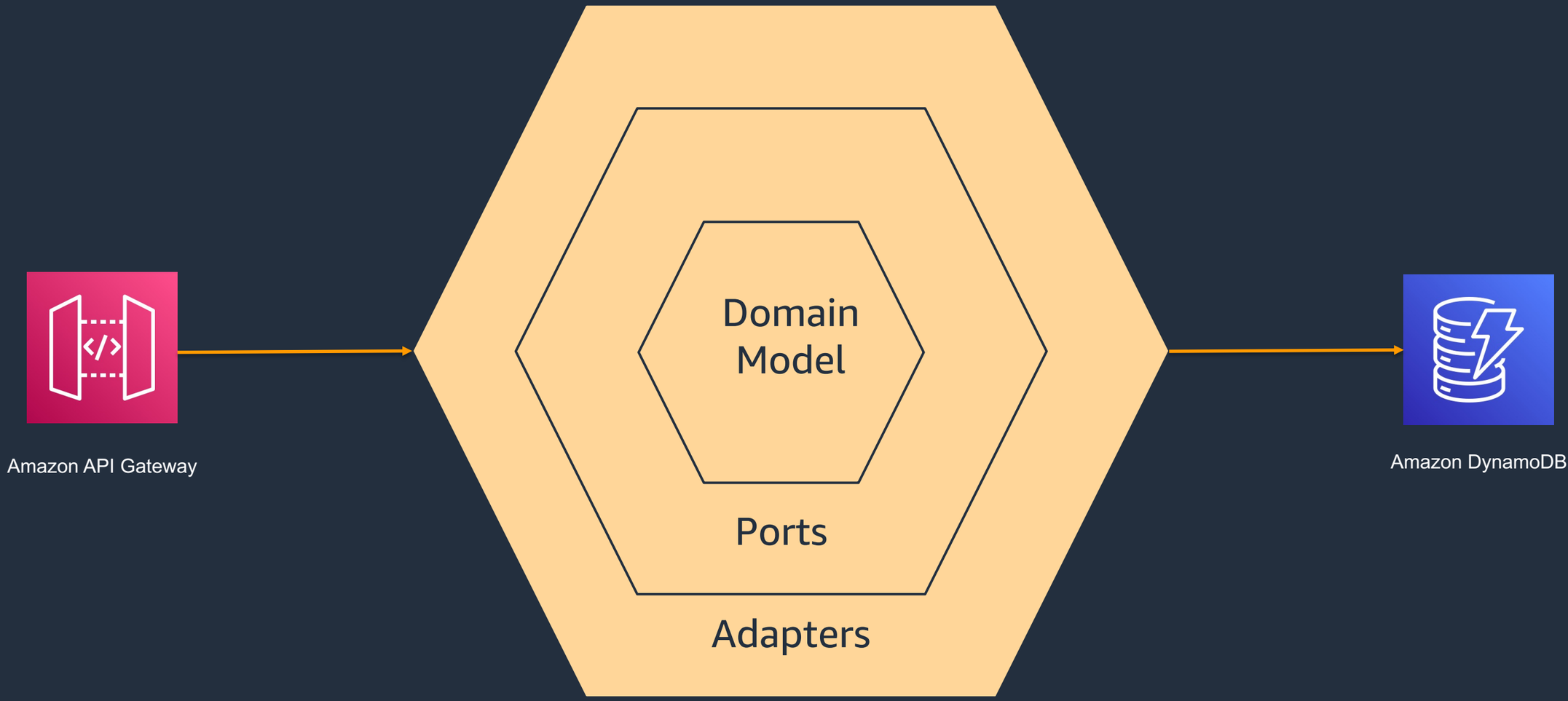
Class diagram: register vaccination reservation



Sequence diagram: register vaccination reservation



Hexagonal architecture with the Lambda function



Unit test for Domain Model

```
def test_cannot_append_slot_more_than_two(fixture_recipient, fixture_slot, fixture_slot_2, fixture_slot_3):
    slot = fixture_slot
    slot2 = fixture_slot_2
    slot3 = fixture_slot_3
    target = fixture_recipient
    target.add_reserve_slot(slot)
    target.add_reserve_slot(slot2)
    ret = target.add_reserve_slot(slot3)
    assert False == ret
    assert 2 == len(target.slots)

def test_cannot_append_same_date_slot(fixture_recipient, fixture_slot):
    slot = fixture_slot
    target = fixture_recipient
    target.add_reserve_slot(slot)
    ret = target.add_reserve_slot(slot)
    assert False == ret
    assert 1 == len(target.slots)
```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Unit test for Ports and Adapters classes

```
class DummyRecipientAdapter(IRecipientAdapter):
    def load(self, recipient_id:str) -> Recipient:
        return Recipient(recipient_id, email, first_name, last_name, age)

    def save(self, recipient:Recipient) -> bool:
        return True
```

```
class DummyModule(Module):
    def configure(self, binder):
        binder.bind(RecipientPort, to=RecipientPort(DummyRecipientAdapter()))
```

```
@pytest.fixture()
def fixture_recipient_port():
    injector = Injector([DummyModule])
    recipient_port = injector.get(RecipientPort)
    return recipient_port
```


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Unit test for Ports and Adapters classes

```
def test_recipient_port_recipient_by_id(fixture_recipient_port):
    target = fixture_recipient_port
    recipient_id = "dummy_number"
    recipient = target.recipient_by_id(recipient_id)
    assert recipient != None
    assert recipient_id == recipient.recipient_id
    assert email == recipient.email
    assert first_name == recipient.first_name
    assert last_name == recipient.last_name
    assert age == recipient.age
```


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app.py calls concrate class instances

```
class RequestPortModule(Module):
    def configure(self, binder):
        binder.bind(ReservationService, to=ReservationService(
            RecipientPort(DDBRecipientAdapter()), SlotPort(DDBSlotAdapter())))
```

```
def lambda_handler(event, context):
body = json.loads(event['body'])
    recipient_id = body['recipient_id']
    slot_id = body['slot_id']

    injector = Injector([RequestPortModule])
    request_port = injector.get(RequestPort)
    status = request_port.make_reservation(recipient_id, slot_id)
```


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Demo

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Summary

- Loosely coupling and strong encapsulation are key concept.
- Hexagonal architecture is an architecture pattern used for encapslating domain logic, and decoupling it from other implementaion details, such as infrastructure or client requests.
- This approach can help create separetion of concerns and sepalate the domain logic from the infrastructure.
- Inversion of control (IoC) or injecting object instances is useful for unit testing with mock or fake objects.

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Please see my sample project on GitHub

- https://github.com/afukui/jaws-pankration-ddd-lambda

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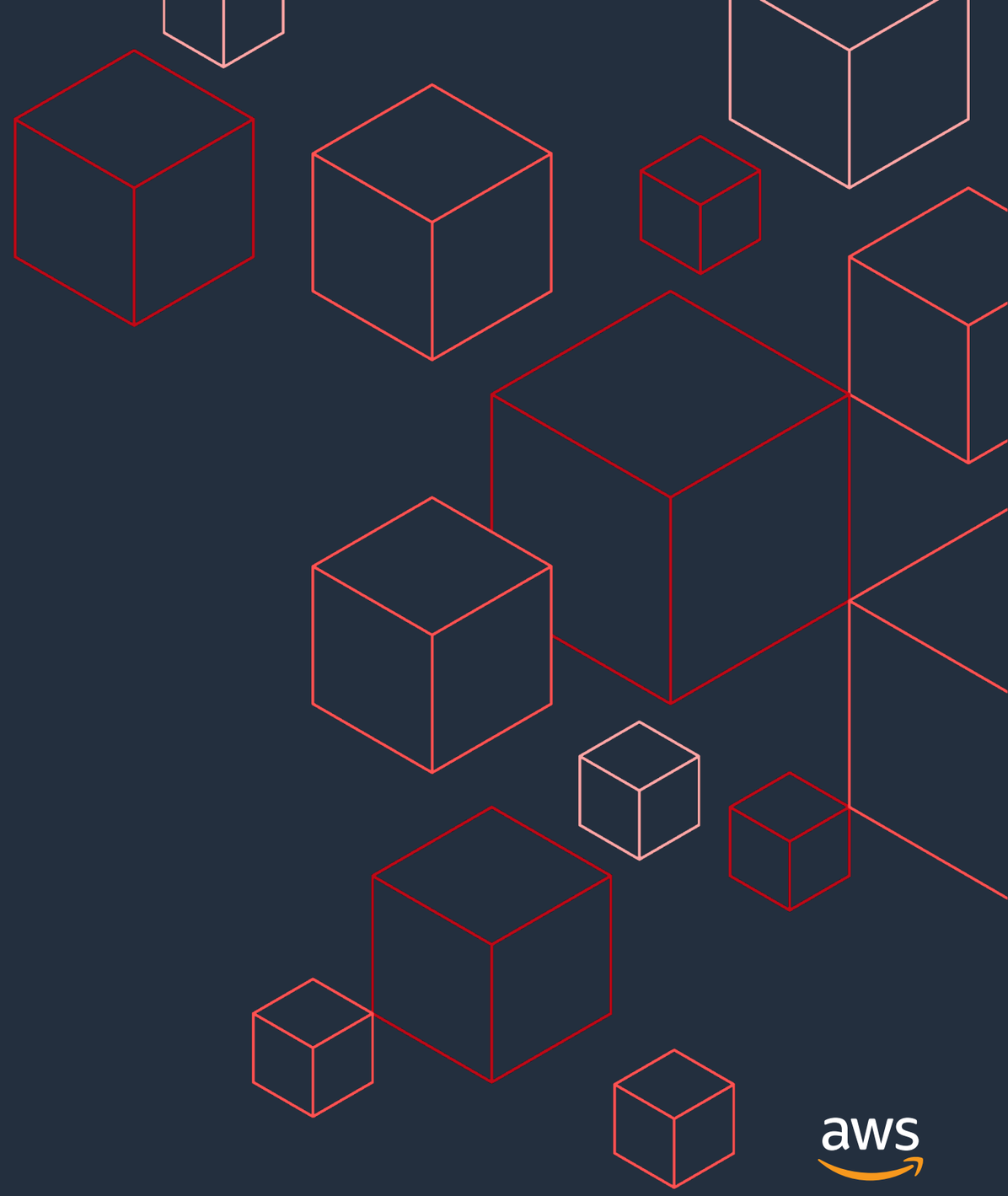
Thank you!



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