Reaping the Benefits of Domain-Driven Design

Adding a Feature to our Application

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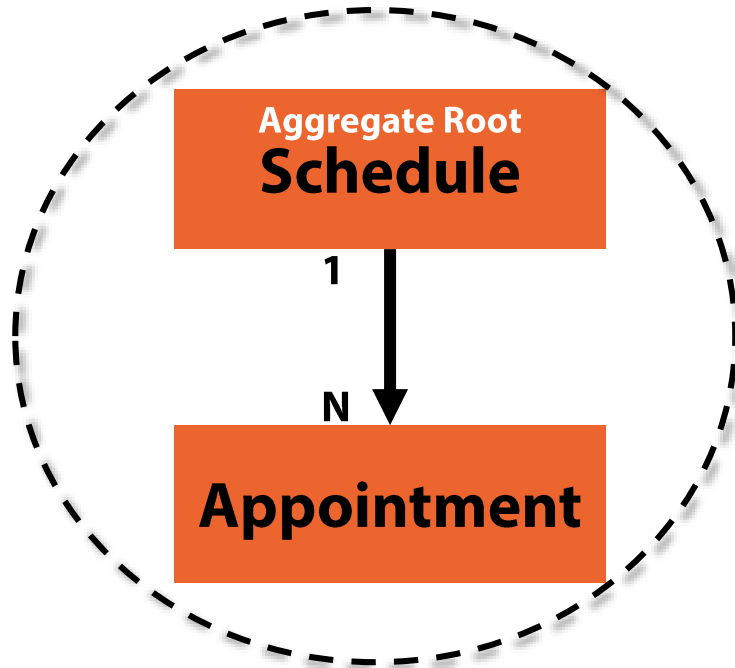@ardalis

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In This Module

- **Review Current System Design**

- **Discuss a New Feature with Customer**

- **Implement the New Feature**

System Design

Schedule Aggregate

Aggregate Root
Schedule

1

N

Appointment

Value Objects

DateTimeRange

AnimalType

Domain Events

AppointmentScheduled

AppointmentUpdated

AppointmentConfirmed

Repository

ScheduleRepository

Another Conversation

New Feature Request: Reminder Emails and Confirming Appointments

Gathering (more) Requirements

- Scheduling Application Is Well-Received So Far

- But… clients still frequently forget appointments

- Staff doesn't have time to call every client

New Features

- Send a confirmation email when the appointment is scheduled

- Send a reminder email the day before client's appointment

- Provide a link in the emails for the client to confirm the appointment

Appointment Confirmation
High Level Workflow

Appointment Scheduled

Send Email to Client

Client Confirms

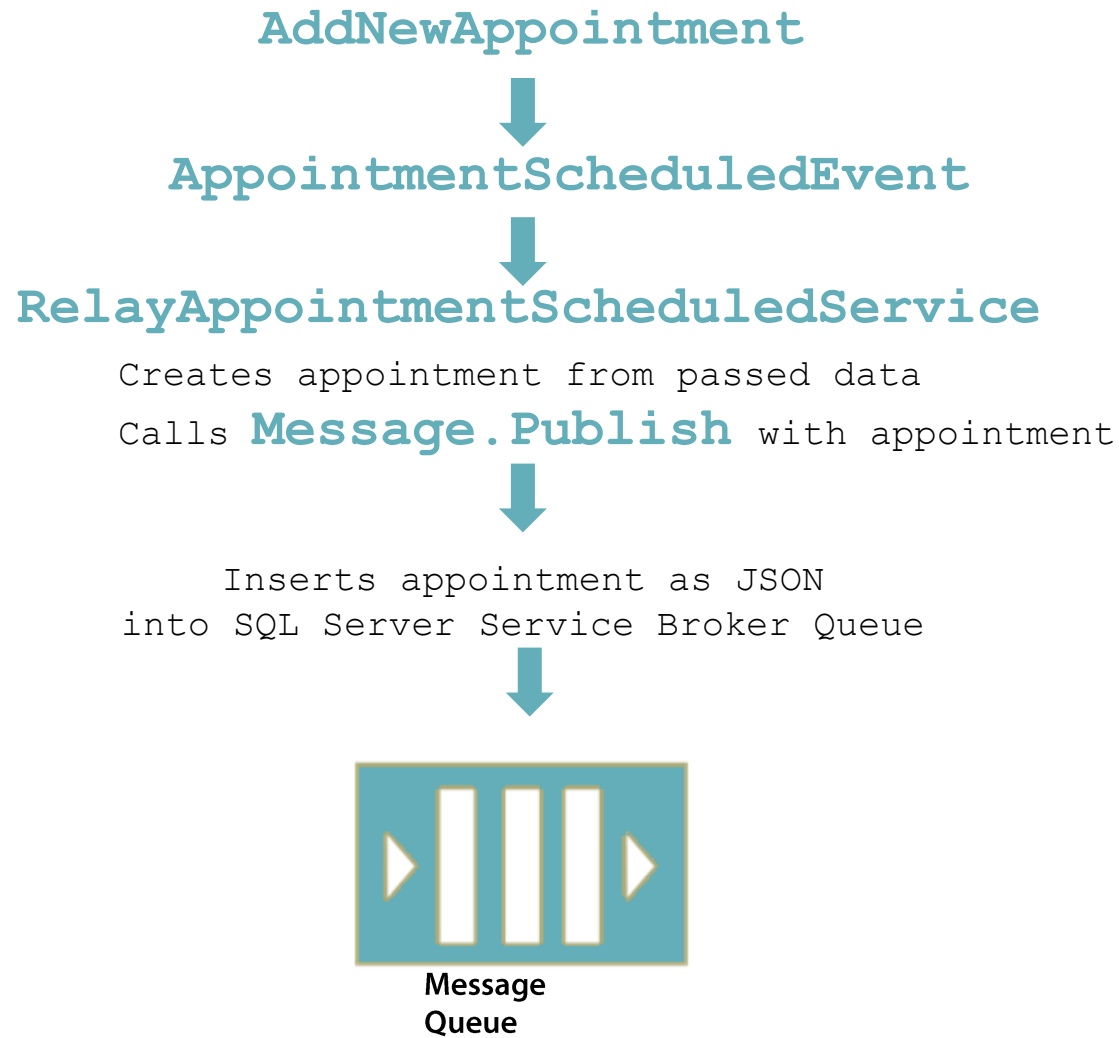# Using What We've Already Learned & Built

Domain Events
Application Events
Event Handlers
Services
Messaging Queues
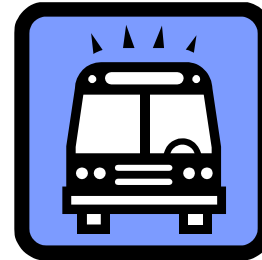
Adding a Message Queue Between Our Apps

Appointment Scheduled

AddNewAppointment

⬇

AppointmentScheduledEvent

⬇

RelayAppointmentScheduledService

Creates appointment from passed data
Calls **Message.Publish** with appointment

⬇

Inserts appointment as JSON
into SQL Server Service Broker Queue

⬇

**Message
Queue**

Messaging

Message Queue

Service Bus

SQL Server Service Broker
RabbitMQ
MSMQ
AWS Queues
Azure Queues

NServiceBus
Azure Service Bus
MassTransit
Neuron ESB
Mule

Peter Ritchie blog: Enterprise Service Buses, Brokers, Message Queues, Oh My!
bit.ly/PeterRitchieMessaging

Send Email

CheckMessages()
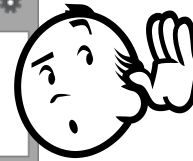
Message Queue

For messages found,
retrieves appointment details and …

SendConfirmationEmail

```
mailMessage.Body = String.Format(
    @"<html><body>Dear {0},<br/>
        <p>Please click the link below to confirm {1}'s appointment for a {2} with {3}
        <p>Thanks!</p>
        <p><a href='{5}'>CONFIRM</a></p>
        <p>Please call the office to reschedule if you will be unable to make it for yc
        <p>Have a great day!</p></body></html>",
    appointment.ClientName,
    appointment.PatientName,
    appointment.AppointmentType,
    appointment.DoctorName,
    appointment.Start.ToString(),
    "http://localhost:51322/appointment/confirm/" + appointment.AppointmentId);
```

Combining Message Queues, Events & Services

Confirmed by Customer

CONFIRM

http://domain/appointment/confirm/{Guid}

`Confirm()`

↓

`Sends AppointmentId to Scheduler Queue in the Service Broker`
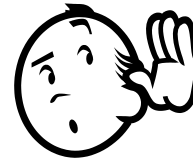
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Message Queue

Notifier Queue

Scheduler Queue

Confirmed in Schedule

CheckMessages()

Message

↓

AppointmentConfirmedEvent

↓

EmailConfirmationHandler

↓

For messages found,
Retrieves Appointment using the AppointmentId from the queue
Appointment.Confirm()

Deep Dive Into The Code

Consider the UI in the Domain Design

"

Most likely I'm learning stuff [with
UI sketching] that affects my story
and scenario

"

— **Jimmy Nilsson**
Developing Core Business Applications with DDD and Microsoft
.NET
TechEd NA 2013

Schedule Control Evokes a Cross-Cutting Concern

Extra Credit – Reminder Emails Service

- **Runs once each morning**

- **Sends out emails for appointments scheduled for the next day**

- **Avoids sending duplicate emails if run multiple times**

- **Avoid sending to clients who haven't opted in**

Key Takeaway

Our DDD design

simplified

adding a new feature

Glossary of Terms from this Module

Message Queue

A tool for storing and retrieving messages, often used by applications to communicate with one another in an disconnected fashion

Service Bus

Software responsible for managing how messages are routed between numerous applications and services
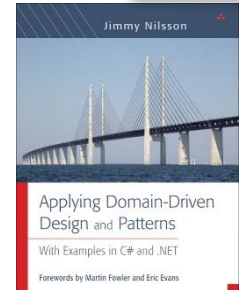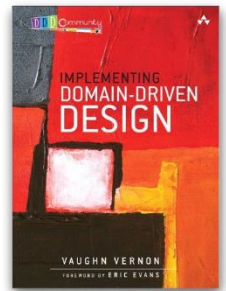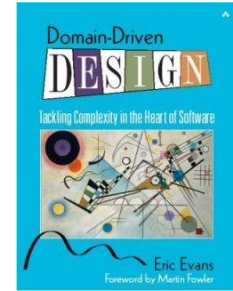
References

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Implementing Domain-Driven Design http://amzn.to/1dgYRY3
Applying DDD with Patterns in .NET and C# http://amzn.to/1ie6CBy

Web
DomainLanguage.com
DDDCommunity.org
Enterprise Service Buses, Brokers, Message Queues, Oh My!
bit.ly/PeterRitchieMessaging
Jimmy Nilsson's TechEd 2013 DDD Talk   http://bit.ly/NilssonDDDTechEd2013
Pinal Dave Intro to Service Broker Blog Post: http://bit.ly/PinalDave_ServiceBroker

Pluralsight
Message Queue Fundamentals in .NET http://bit.ly/ps_messagequeue

Tools
SMTP4Dev http://smtp4dev.codeplex.com

Thanks!

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To Teach Is To Learn Twice

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