

Reaping the Benefits of Domain-Driven Design

Adding a Feature to our Application

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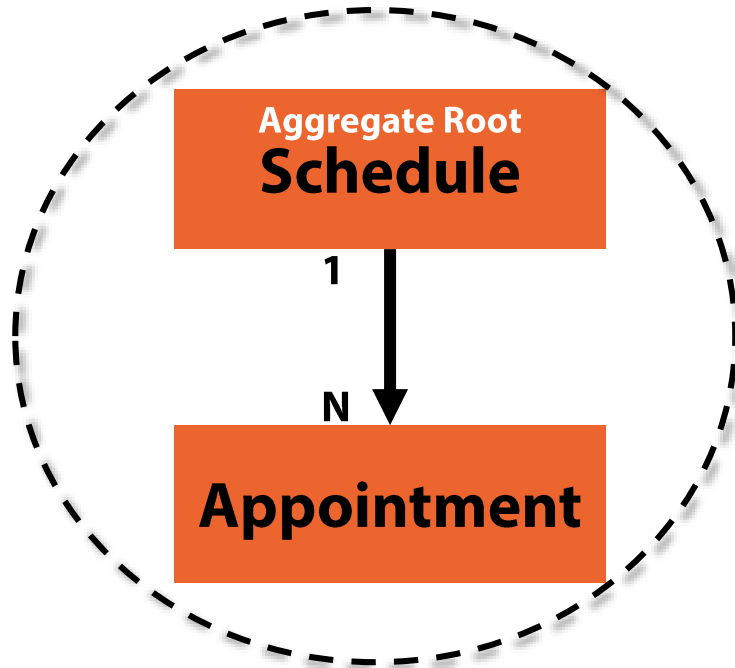
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hardcore dev and IT training

In This Module

- **Review Current System Design**
- **Discuss a New Feature with Customer**
- **Implement the New Feature**

System Design

Schedule Aggregate



Repository

ScheduleRepository

Value Objects

DateTimeRange

AnimalType

Domain Events

AppointmentScheduled

AppointmentUpdated

AppointmentConfirmed

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

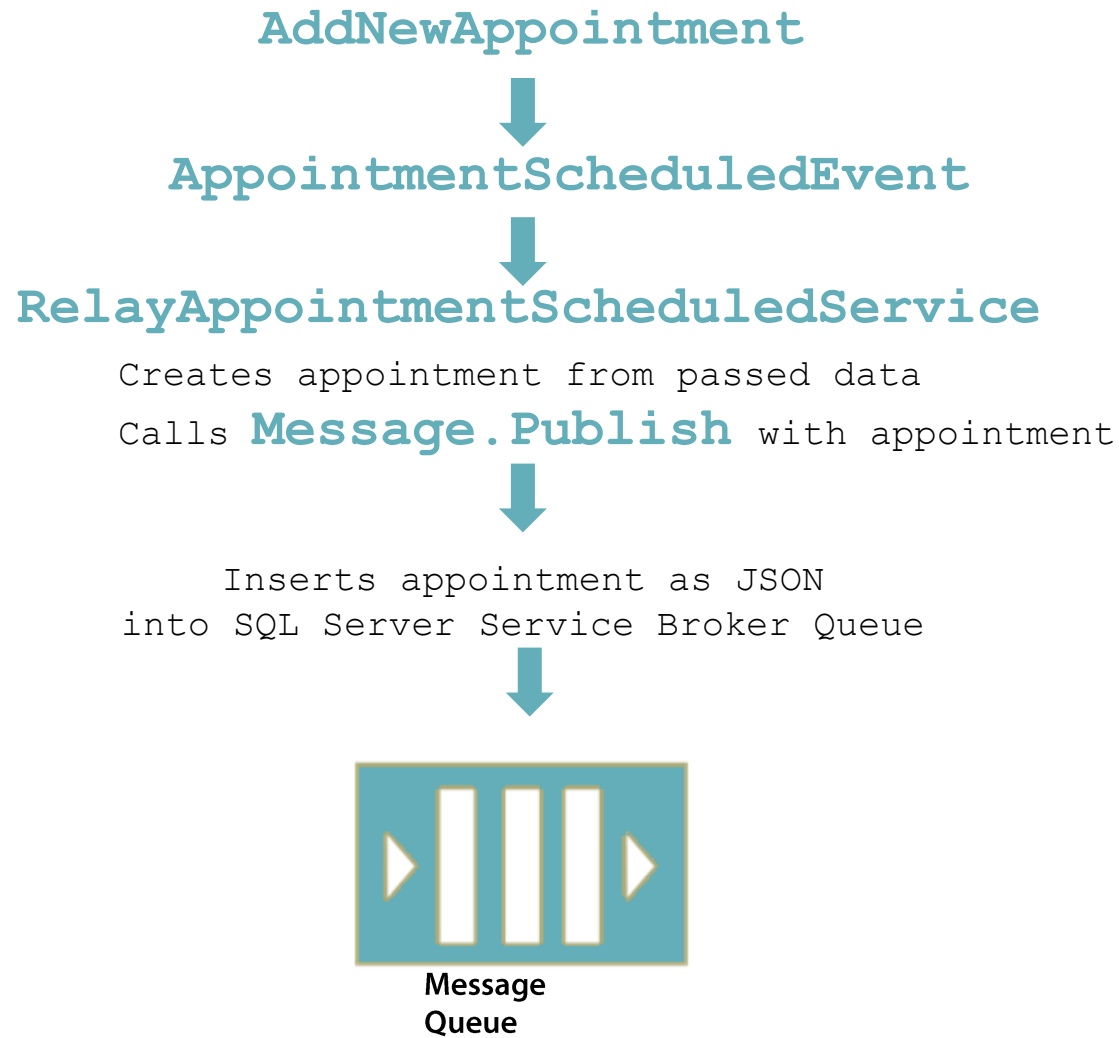
Event Handlers

Services

Messaging Queues

Adding a Message Queue Between Our Apps

Appointment Scheduled

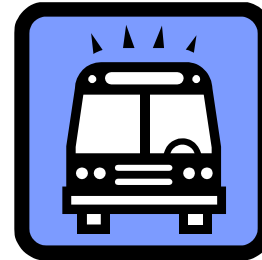


Messaging



Message Queue

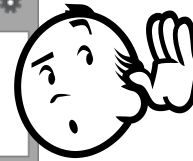
SQL Server Service Broker
RabbitMQ
MSMQ
AWS Queues
Azure Queues



Service Bus

NServiceBus
Azure Service Bus
MassTransit
Neuron ESB
Mule

Send Email



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}<br/>
    <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<br/>
    <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`



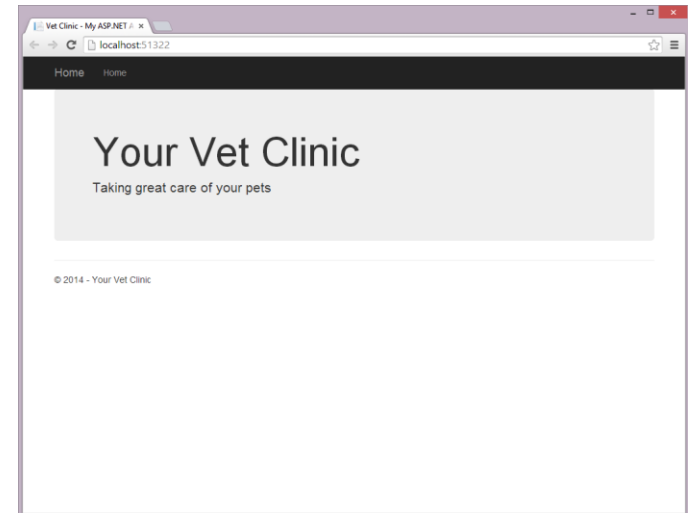
Message
Queue

Client: Patient: **Vet Manager** Schedule Clients Doctors Rooms

Appointments

Today Monday, June 09, 2014 Day Work Week Agenda

	Exam Room 1 Dr. Smith	Exam Room 2 Dr. Jones	Exam Room 3	Exam Room 4	Exam Room 5
	Mon 6/09	Mon 6/09	Mon 6/09	Mon 6/09	Mon 6/09
7:00 AM					
8:00 AM	(DE) Corde - Joe Eames		(DE) Rocky - Brian Lagunas	(DE) Barney - Andrew Mallett	(DE) Anubis - Patrick Hynds
9:00 AM	(DE) Tinkerbell - Michael (DE) Radar - Michael Perry	(DE) Willie - Tyler Young	(DE) Charlie - Jesse Liberty (DE) Allegra - Jesse	(DE) Ruske - Julie Yack (DE) Tinkabel - Reindert-Jan (DE) Lizzie - Julie Yack	(DE) Callie - Michael Perry



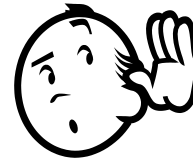
Notifier Queue



Scheduler Queue

Confirmed in Schedule

CheckMessages()



Message

AppointmentConfirmedEvent

EmailConfirmationHandler

For messages found,
Retrieves Appointment using the AppointmentId from the queue

Appointment.Confirm()

Client: Vet Manager
Patient: Schedule Clients Doctors Rooms

Appointments

Today Monday, June 09, 2014

	Exam Room 1 Dr. Smith	Exam Room 2 Dr. Jones	Exam Room 3	Exam Room 4	Exam Room 5
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9:00 AM	(DE) Tinkerbelle - Michael Perry (DE) Radar - Michael Perry	(DE) Willie - Tyler Young (DE) JoeFish - Tyler Young	(DE) Charlie - Jesse Liberty (DE) Allegra - Jesse Liberty	(DE) Ruske - Julie Yack (DE) Tinkerbelle - Reindert-Jan (DE) Lizzie - Julie Yack	(DE) Callie - Michael Perry

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

The screenshot displays the Telerik TeamSchedule web application. At the top left is the Telerik logo. To its right, the title "TeamSchedule" is shown in a large, grey font. Further right, three user profile pictures are displayed above a horizontal timeline with colored markers (red, blue, green) and checkmarks. Below this header is a navigation bar with tabs for "Today", "Monday, June 10, 2013 - Friday, J...", "Day", "Work Week" (selected), "Week", "Month", and "Agenda". The main area is a calendar grid for the week of June 10-14, 2013. The grid has columns for each day and rows for hourly slots from 7:00 AM to 2:00 PM. A blue event block labeled "Take the dog to the vet" is scheduled for Monday, June 10, from 7:00 AM to 8:00 AM. Another blue event block labeled "Call Charlie about the project" is scheduled for Tuesday, June 11, from 11:00 AM to 12:00 PM. A blue event block labeled "Alex's Birthday" is scheduled for Friday, June 14, for the entire day. A vertical scrollbar is visible on the right side of the calendar grid. At the bottom left, there is a button labeled "Show business hours" with a clock icon.

Telerik

TeamSchedule

Today ◀ ▶ 📅 Monday, June 10, 2013 - Friday, J...

Day **Work Week** Week Month Agenda

	Mon 6/10	Tue 6/11	Wed 6/12	Thu 6/13	Fri 6/14
all day					Alex's Birthday
7:00 AM	Take the dog to the vet				
8:00 AM					
9:00 AM					
10:00 AM					
11:00 AM		Call Charlie about the project			
12:00 PM					
1:00 PM					
2:00 PM					

🕒 Show business hours

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

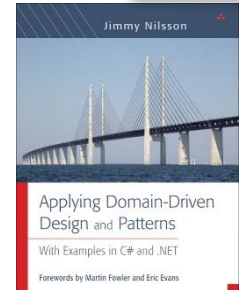
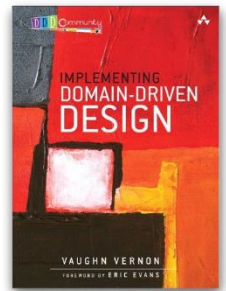
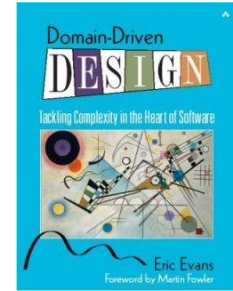
References

Books

Domain-Driven Design <http://amzn.to/1kstiRg>

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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