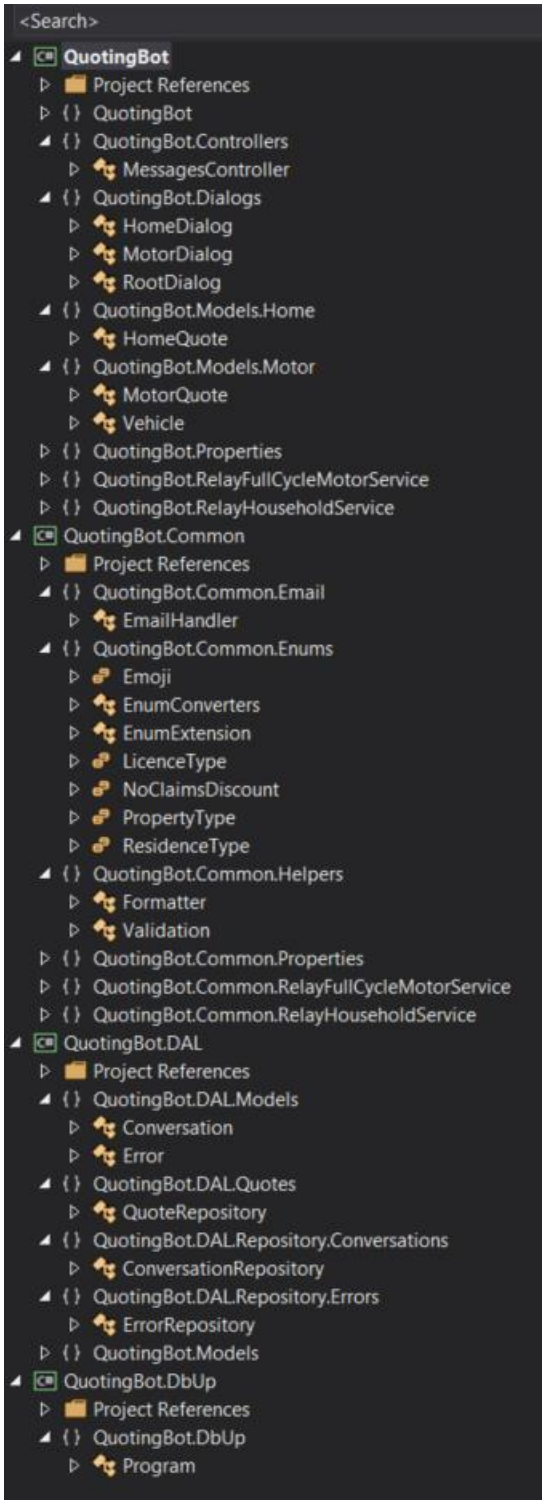
Code Listing

Code Dictionary



Code Listing

MessagesController.cs

```
using System.Net;
using System.Net.Http;
using System.Threading.Tasks;
using System.Web.Http;
using Microsoft.Bot.Builder.Dialogs;
using Microsoft.Bot.Connector;
using QuotingBot.Dialogs;

namespace QuotingBot.Controllers
{
    [BotAuthentication]
    public class MessagesController : ApiController
    {
        public async Task<HttpResponseMessage> Post([FromBody]Activity activity)
        {
            if (activity.Type == ActivityTypes.Message)
            {
                await Conversation.SendAsync(activity, () => new RootDialog());
            }
            else
            {
                HandleSystemMessage(activity);
            }
            var response = Request.CreateResponse(HttpStatusCode.OK);
            return response;
        }

        private Activity HandleSystemMessage(Activity message)
        {
            switch (message.Type)
            {
                case ActivityTypes.DeleteUserData:
                    // Implement user deletion here
                    // If we handle user deletion, return a real message
                    break;
                case ActivityTypes.ConversationUpdate:
                    // Handle conversation state changes, like members being added and
removed
                    // Use Activity.MembersAdded and Activity.MembersRemoved and
Activity.Action for info
                    // Not available in all channels
                    break;
                case ActivityTypes.ContactRelationUpdate:
                    // Handle add/remove from contact lists
                    // Activity.From + Activity.Action represent what happened
                    break;
                case ActivityTypes.Typing:
                    // Handle knowing tha the user is typing
                    break;
                case ActivityTypes.Ping:
                    break;
            }

            return null;
        }
    }
}
```

HomeDialog.cs

```
using System;
using System.Collections.Generic;
using System.Configuration;
using System.Globalization;
using System.Threading.Tasks;
using System.Web.Script.Serialization;
using Microsoft.Bot.Builder.Dialogs;
using Microsoft.Bot.Builder.FormFlow;
using Microsoft.Bot.Connector;
using QuotingBot.Common.Email;
using QuotingBot.Common.Enums;
using QuotingBot.DAL.Quotes;
using QuotingBot.DAL.Repository.Conversations;
using QuotingBot.DAL.Repository.Errors;
using QuotingBot.Common.Helpers;
using QuotingBot.Models.Home;
using QuotingBot.Common.RelayHouseholdService;

namespace QuotingBot.Dialogs
{
    [Serializable]
    public class HomeDialog : IDialog<object>
    {
        private readonly Validation _validation = new Validation();
        private static readonly bool SendEmails =
Convert.ToBoolean(ConfigurationManager.AppSettings["SendEmails"]);
        private static readonly string Connection =
ConfigurationManager.ConnectionStrings["QuotingBot"].ConnectionString;
        private static readonly ErrorRepository ErrorRepository = new
ErrorRepository(Connection);

        public async Task StartAsync(IDialogContext context)
        {
            await context.PostAsync($"No worries - let's do it
{Emoji.GrinningFace.GetDescription()}");

            var homeQuoteFormDialog = FormDialog.FromForm(this.BuildHomeQuoteForm,
FormOptions.PromptInStart);
            context.Call(homeQuoteFormDialog, ResumeAfterHomeQuoteFormDialog);
        }

        private IForm<HomeQuote> BuildHomeQuoteForm()
        {
            OnCompletionAsyncDelegate<HomeQuote> getHomeQuotes = async (context,
state) =>
            {
                await context.PostAsync("Getting your quotes...");
            };

            return new FormBuilder<HomeQuote>()
                .Field(nameof(HomeQuote.FirstLineOfAddress))
                .Field(nameof(HomeQuote.Town),
                    validate: async (state, value) => _validation.ValidateTown(value))
                .Field(nameof(HomeQuote.County),
                    validate: async (state, value) =>
_validation.ValidateCounty(value))
                .AddRemainingFields()
                .Field(nameof(HomeQuote.NumberOfBedrooms),
                    prompt: "How many bedrooms are in the property? (0-9 bedrooms)",
                    validate: async (state, value) =>
_validation.ValidateNumberOfBedrooms(value))
```

```
                .Field(nameof(HomeQuote.YearBuilt),
                    validate: async (state, value) =>
_validation.ValidateYearBuilt(value))
                .Field(nameof(HomeQuote.FirstName),
                    validate: async (state, value) =>
_validation.ValidateFirstName(value))
                .Field(nameof(HomeQuote.LastName),
                    validate: async (state, value) =>
_validation.ValidateLastName(value))
                .AddRemainingFields()
                .Field(nameof(HomeQuote.EmailAddress),
                    validate: async (state, value) =>
_validation.ValidateEmailAddress(value))
                .Confirm("Do you want to request a quote using the following
details?\n\n" +
                         "\n\n" +
                         "Address: {FirstLineOfAddress}, {Town}, {County}\n\n" +
                         "Property type: {PropertyType}\n\n" +
                         "Residence type: {ResidenceType}\n\n" +
                         "Year built: {YearBuilt}\n\n" +
                         "No.of bedrooms: {NumberOfBedrooms}\n\n" +
                         "Name: {FirstName} {LastName}\n\n" +
                         "Contact number: {PrimaryContactNumber}\n\n" +
                         "Email: {EmailAddress}")
                .OnCompletion(getHomeQuotes)
                .Build();
        }

        private static async Task ResumeAfterHomeQuoteFormDialog(IDialogContext
context, IAwaitable<HomeQuote> result)
        {
            var state = await result;

            try
            {
                var quoteRepository = new QuoteRepository(Connection);
                var conversationRepository = new ConversationRepository(Connection);
                var reply = context.MakeMessage();

                var homeService = new Household();
                var homeWebServiceRequest =
HomeQuote.BuildHomeWebServiceRequest(state);

                var quotes = new List<HomeQuoteWebServiceResult>();
                var response = homeService.GetQuotes(homeWebServiceRequest);

                if (response.Quotes != null)
                {
                    foreach (var quote in response.Quotes)
                    {
                        quotes.Add(quote);
                    }

                    reply.AttachmentLayout = AttachmentLayoutTypes.Carousel;
                    reply.Attachments = GetQuoteReceipts(quotes);

                    quoteRepository.StoreQuote
                    (
                        context.Activity.Conversation.Id,
                        response.Quotes[0].RelayQuoteId,
                        new JavaScriptSerializer().Serialize(quotes)
                    );
```

```
                }
                else
                {
                    reply.Text = "Sorry, we couldn't get any quotes for you.";
                }

                await context.PostAsync(reply);

                if (SendEmails)
                {
                    var emailBodyForUser =
EmailHandler.BuildHomeEmailBodyForUser(response.Quotes, state.FirstName,
state.LastName, state.PrimaryContactNumber, state.EmailAddress,
                        state.FirstLineOfAddress, state.Town, state.County,
state.PropertyType.GetDescription(), state.ResidenceType.GetDescription(),
state.YearBuilt,
                        state.NumberOfBedrooms.ToString());
                    EmailHandler.SendEmailToUser(state.EmailAddress,
$"{state.FirstName} {state.LastName}", emailBodyForUser);
                    var emailBodyForBroker =
EmailHandler.BuildHomeEmailBodyForBroker(response.Quotes, state.FirstName,
state.LastName, state.PrimaryContactNumber, state.EmailAddress,
                        state.FirstLineOfAddress, state.Town, state.County,
state.PropertyType.GetDescription(), state.ResidenceType.GetDescription(),
state.YearBuilt,
                        state.NumberOfBedrooms.ToString());
                    EmailHandler.SendEmailToBroker(state.EmailAddress,
$"{state.FirstName} {state.LastName}", emailBodyForBroker);
                }

                conversationRepository.StoreConversation
                (
                    context.Activity.Conversation.Id,
                    context.Activity.From.Id,
                    DateTime.Now.ToString(new CultureInfo("en-GB")),
                    new JavaScriptSerializer().Serialize(context)
                );
            }
            catch (Exception exception)
            {
                var errorRepository = new ErrorRepository(Connection);
                errorRepository.LogError(context.Activity.Conversation.Id,
context.Activity.From.Id, DateTime.Now.ToString(),
context.ConversationData.ToString(), exception.ToString());
                throw;
            }
            finally
            {
                context.Done(state);
            }
        }

        private static IList<Attachment>
GetQuoteReceipts(List<HomeQuoteWebServiceResult> homeQuoteWebServiceResults)
        {
            var cards = new List<Attachment>();

            foreach (var result in homeQuoteWebServiceResults)
            {
                if (result.NetPremium > 0)
                {
                    cards.Add(GetReceiptCard(result));
```

```
                }
            }

            return cards;
        }

        private static Attachment GetReceiptCard(HomeQuoteWebServiceResult
homeQuoteWebServiceResult)
        {
            try
            {
                var receiptCard = new ReceiptCard
                {
                    Title = $"{homeQuoteWebServiceResult.InsurerName}",
                    Facts = new List<Fact> { new Fact("Scheme",
homeQuoteWebServiceResult.SchemeName) },
                    Tax = $"€{homeQuoteWebServiceResult.GovernmentLevyPremium}",
                    Total = $"€{homeQuoteWebServiceResult.NetPremium}",
                    Buttons = new List<CardAction>
                    {
                        new CardAction
                        (
                            ActionTypes.PostBack,
                            "Request a Callback"
                        )
                    }
                };

                return receiptCard.ToAttachment();
            }
            catch (Exception exception)
            {
                ErrorRepository.LogError(DateTime.Now.ToString(new CultureInfo("en-
GB")), exception.ToString());
                throw;
            }
        }
    }
}
```

MotorDialog.cs

```
using Microsoft.Bot.Builder.Dialogs;

using Microsoft.Bot.Builder.FormFlow;

using System;

using System.Threading.Tasks;

using QuotingBot.Models.Motor;

using System.Web.Script.Serialization;

using QuotingBot.DAL.Quotes;

using QuotingBot.DAL.Repository.Errors;

using Microsoft.Bot.Connector;

using System.Collections.Generic;

using System.Configuration;

using System.Globalization;

using System.Linq;

using QuotingBot.Common.Helpers;

using QuotingBot.Common.Email;

using QuotingBot.Common.Enums;

using QuotingBot.DAL.Repository.Conversations;

using QuotingBot.Common.RelayFullCycleMotorService;


namespace QuotingBot.Dialogs

{

   [Serializable]

   public class MotorDialog : IDialog<MotorQuote>

   {

      private readonly Validation _validation = new Validation();

      private static readonly bool SendEmails =
Convert.ToBoolean(ConfigurationManager.AppSettings["SendEmails"]);

      private static readonly string Connection =
ConfigurationManager.ConnectionStrings["QuotingBot"].ConnectionString;

      private static readonly ErrorRepository ErrorRepository = new ErrorRepository(Connection);
```

```
public async Task StartAsync(IDialogContext context)
{
    await context.PostAsync("No problem!");
    await context.PostAsync($"Let's get started {Emoji.GrinningFace.GetDescription()}");

    var motorQuoteFormDialog = FormDialog.FromForm(this.BuildMotorQuoteForm,
FormOptions.PromptInStart);
    context.Call(motorQuoteFormDialog, this.ResumeAfterMotorQuoteFormDialog);
}

private IForm<MotorQuote> BuildMotorQuoteForm()
{
    OnCompletionAsyncDelegate<MotorQuote> getMotorQuotes = async (context, state) =>
    {
        await context.PostAsync("Getting your quotes...");
    };

    return new FormBuilder<MotorQuote>()
        .Field(nameof(MotorQuote.VehicleRegistration),
            validate: async (state, value) =>
            {
                var result = new ValidateResult();
                state.Vehicle = MotorQuote.GetVehicle(value.ToString());

                if (!string.IsNullOrEmpty(state.Vehicle.Description))
                {
                    result.IsValid = true;
                    result.Value = value.ToString().ToUpper();
                    result.Feedback = state.Vehicle.Description;
                }
                else
```

```
                {
                    result.IsValid = false;
                    result.Feedback = $"Hmmm...I couldn't find a match for that registration {Emoji.ThinkingFace.GetDescription()} Please try another registration";
                }
                return result;
            }
        )
        .Confirm(generateMessage: async (state) => new PromptAttribute("Is this your car?"))
        .Field(nameof(MotorQuote.VehicleValue),
            validate: async (state, value) => _validation.ValidateVehicleValue(value))
        .Field(nameof(MotorQuote.AreaVehicleIsKept),
            validate: async (state, value) => _validation.ValidateAreaVehicleIsKept(value))
        .Field(nameof(MotorQuote.FirstName),
            validate: async (state, value) => _validation.ValidateFirstName(value))
        .Field(nameof(MotorQuote.LastName),
            validate: async (state, value) => _validation.ValidateLastName(value))
        .Field(nameof(MotorQuote.DateOfBirth),
            prompt: "What is your date of birth? Enter date in DD/MM/YYYY format please",
            validate: async (state, value) => _validation.ValidateDateOfBirth(value))
        .AddRemainingFields()
        .Field(nameof(MotorQuote.EmailAddress),
            validate: async (state, value) => _validation.ValidateEmailAddress(value))
        .Confirm("Do you want to request a quote using the following details?\n\n" +
                "\n\n" +
                "Car registration: {VehicleRegistration}\n\n" +
                "Vehicle value: {VehicleValue}\n\n" +
                "Area vehicle is kept: {AreaVehicleIsKept}\n\n" +
                "Name: {FirstName} {LastName}\n\n" +
                "Date of birth: {DateOfBirth}\n\n" +
                "Licence Type: {LicenceType}\n\n" +
```

```
                "No claims Discount: {NoClaimsDiscount} years\n\n" +
                "Contact number: {PrimaryContactNumber}\n\n" +
                "Email: {EmailAddress}")
            .OnCompletion(getMotorQuotes)
            .Build();
    }

    private async Task ResumeAfterMotorQuoteFormDialog(IDialogContext context,
IAwaitable<MotorQuote> result)
    {
        var state = await result;
        var reply = context.MakeMessage();

        try
        {
            var quoteRepository = new QuoteRepository(Connection);
            var conversationRepository = new ConversationRepository(Connection);
            var motorService = new
Common.RelayFullCycleMotorService.RelayFullCycleMotorService();

            var riskData = MotorQuote.BuildIrishMQRiskInfo(state);
            var messageRequestInfo = MotorQuote.BuildMessageRequestInfo();

            var quotes = motorService.GetNewBusinessXBreakDownsSpecified(riskData, 100, true, null,
messageRequestInfo);

            if (quotes.Quotations != null)
            {
                if (quotes.Quotations.Length > 0)
                {
                    quoteRepository.StoreQuote
                    (
```

```
                    context.Activity.Conversation.Id,
                    quotes.TransactionID,
                    new JavaScriptSerializer().Serialize(quotes.Quotations[0])
                );

                reply.AttachmentLayout = AttachmentLayoutTypes.Carousel;
                reply.Attachments = GetQuoteReceipts(quotes.Quotations);

                if (SendEmails)
                {
                    var emailToUserBody =
EmailHandler.BuildMotorEmailBodyForUser(quotes.Quotations,
                        state.FirstName, state.LastName, state.DateOfBirth,
                        state.PrimaryContactNumber, state.EmailAddress, state.VehicleRegistration,
                        state.Vehicle.Description, state.VehicleValue,
                        state.AreaVehicleIsKept, state.LicenceType.GetDescription(),
                        state.NoClaimsDiscount.GetDescription());
                    EmailHandler.SendEmailToUser(state.EmailAddress, $"{state.FirstName}
{state.LastName}",
                        emailToUserBody);
                    var emailToBrokerBody =
EmailHandler.BuildMotorEmailBodyForBroker(quotes.Quotations,
                        state.FirstName, state.LastName, state.DateOfBirth,
                        state.PrimaryContactNumber, state.EmailAddress, state.VehicleRegistration,
                        state.Vehicle.Description, state.VehicleValue,
                        state.AreaVehicleIsKept, state.LicenceType.GetDescription(),
                        state.NoClaimsDiscount.GetDescription());
                    EmailHandler.SendEmailToBroker(state.EmailAddress, $"{state.FirstName}
{state.LastName}",
                        emailToBrokerBody);
                }
```

```
                await context.PostAsync(reply);
            }
        }
        else
        {
            await context.PostAsync("Sorry, we were unable to get your a quote at this point.");
        }

        conversationRepository.StoreConversation
        (
            context.Activity.Conversation.Id,
            context.Activity.From.Id,
            DateTime.Now.ToString(new CultureInfo("en-GB")),
            new JavaScriptSerializer().Serialize(context)
        );
    }
    catch (Exception exception)
    {
        ErrorRepository.LogError(context.Activity.Conversation.Id, context.Activity.From.Id,
DateTime.Now.ToString(new CultureInfo("en-GB")), context.ConversationData.ToString(),
exception.ToString());
        throw;
    }
    finally
    {
        context.Done(state);
    }
}

private IList<Attachment> GetQuoteReceipts(IrishMQResultsBreakdown[] breakdowns)
{
    return breakdowns.Select(breakdown => BuildReceiptCard(breakdown)).ToList();
```

```
    }

    private static Attachment BuildReceiptCard(IrishMQResultsBreakdown breakdown)
    {
        try
        {
            var receiptCard = new ReceiptCard
            {
                Title = $"Insurer: {breakdown.Premium.SchemeName}",
                Facts = new List<Fact> { new Fact("Scheme",
breakdown.Premium.Scheme.SchemeNumber) },
                Tax = $"€{breakdown.Premium.PremiumAfterLevy -
breakdown.Premium.PremiumBeforeLevy}",
                Total = $"€{breakdown.Premium.TotalPremium}",
                Buttons = new List<CardAction>
                {
                    new CardAction
                    (
                        ActionTypes.PostBack,
                        "Request a Callback"
                    )
                }
            };

            return receiptCard.ToAttachment();
        }
        catch (Exception exception)
        {
            ErrorRepository.LogError(DateTime.Now.ToString(new CultureInfo("en-GB")),
exception.ToString());
            throw;
        }
```

```
    }
  }
}
```

RootDialog.cs

```
using System;
using System.Collections.Generic;
using System.Threading.Tasks;
using Microsoft.Bot.Builder.Dialogs;
using QuotingBot.Common.Enums;

namespace QuotingBot.Dialogs
{
    [Serializable]
    public sealed class RootDialog : IDialog<object>
    {
        private static readonly string MotorInsuranceOption = $"Motor insurance
{Emoji.Car.GetDescription()}";
        private static readonly string HomeInsuranceOption = $"Home insurance
{Emoji.House.GetDescription()}";
        public async Task StartAsync(IDialogContext context)
        {
            await context.PostAsync("Hi, I'm Ava - your friendly quoting bot!");
            context.Wait(MessageReceivedAsync);
        }

        public static void ShowQuoteOptions(IDialogContext context)
        {
            PromptDialog.Choice
            (
                context,
                OnOptionSelected,
                new List<string> { MotorInsuranceOption, HomeInsuranceOption },
                "What can I get you a quote for today?",
                "Hmmm...that's not a valid option.  Please choose an option from the
list."
            );
        }

        private static async Task OnOptionSelected(IDialogContext context,
IAwaitable<string> result)
        {
            try
            {
                var optionSelected = await result;

                if (optionSelected == MotorInsuranceOption)
                {
                    context.Call(new MotorDialog(), ResumeAfterOptionDialog);
                }
                else
                {
                    context.Call(new HomeDialog(), ResumeAfterOptionDialog);
                }
            }
            catch (Exception)
            {
                await context.PostAsync($"Oops! Something went wrong.");
            }
        }

        private static async Task ResumeAfterOptionDialog(IDialogContext context,
IAwaitable<object> result)
        {
            try
            {
```

```
                var message = await result;
            }
            catch (Exception ex)
            {
                await context.PostAsync($"Failed with message: {ex.Message}");
            }
            finally
            {
                context.Wait(MessageReceivedAsync);
            }
        }

        public static async Task MessageReceivedAsync(IDialogContext context,
IAwaitable<object> result)
        {
            ShowQuoteOptions(context);
        }
    }
}
```

HomeQuote.cs

```
using System;
using QuotingBot.Common.Enums;
using QuotingBot.Common.RelayHouseholdService;
using PropertyType = QuotingBot.Common.Enums.PropertyType;
using ResidenceType = QuotingBot.Common.Enums.ResidenceType;

namespace QuotingBot.Models.Home
{

    [Serializable]
    public class HomeQuote
    {
        public static EnumConverters enumConverters = new EnumConverters();

        public string FirstLineOfAddress;
        public string Town;
        public string County;
        public PropertyType? PropertyType;
        public ResidenceType? ResidenceType;
        public int? NumberOfBedrooms;
        public string YearBuilt;
        public string FirstName;
        public string LastName;
        public string PrimaryContactNumber;
        public string EmailAddress;

        public static HomeWebServiceRequest BuildHomeWebServiceRequest(HomeQuote
state)
        {
            var request = new HomeWebServiceRequest
            {
                PolicyHolders = new PolicyHolder[1],
                Risks = new Risk[2]
            };

            var policyHolder = new PolicyHolder
            {
                EffectivePrimaryPolicyHolder = true,
                OccupationType = OccupationType.QuantitySurveyor,
                EmployersBusinessType = EmployersBusinessType.Unknown,
                ProfessionalBodyType = ProfessionalBodyType.Unknown,
                MaritalStatus = MaritalStatus.Single,
                EmploymentType = EmploymentType.Employed,
                FirstTimeBuyer = false,
                Smoker = false,
                Cancelled = false,
                Declined = false,
                Conviction = false,
                DeclaredBankrupt = false,
                SpecialConditions = false,
                Relationship = RelationshipType.Unknown,
                Contact = new Contact
                {
                    Title = PersonTitle.Mr,
                    FirstName = state.FirstName,
                    Surname = state.LastName,
                    Address = new Address
                    {
                        BuildingName = "Dranagh",
                        StreetName = state.FirstLineOfAddress,
                        Town = state.Town,
```

```
                    County = state.County
                },
                DateOfBirth = new DateTime(1987, 03, 12, 00, 00, 00),
                PhoneNumber = state.PrimaryContactNumber,
                EmailAddress = state.EmailAddress
            }
        };

        request.RelayNumber = "RE0930";
        request.Password = "1IJ4^E?K]Syb>w";
        request.BrokerId = "5016";
        request.LoginId = "eQuote";
        request.BrokerName = "First Ireland Risk Management";
        request.ClientVersion = 0;
        request.BusinessProcess = BusinessProcess.NewBusiness;
        request.ProcessingType = InsurerConfirmationProcessingType.Standard;

        request.Policy = new Policy
        {
            EffectiveStartDate = DateTime.Now,
            VoluntaryExcess = 0,
            BrokerPolicyReference = "NOV17-Y8AONF",
            CorrespondenceContact = new Contact()
            {
                Title = PersonTitle.Unknown,
                DateOfBirth = new DateTime(0001, 01, 01, 00, 00, 00)
            }
        };

        request.PolicyHolders[0] = policyHolder;

        request.Occupancy = new Occupancy
        {
            ResidenceType =
enumConverters.ConvertResidencyType(state.ResidenceType),
            ProposerType = ProposerType.Unspecified,
            YearsLivingAtAddress = 0,
            NumberOfPayingGuests = 0,
            SocialWelfareLet = false,
            IsFurnished = false,
            NormalDaytimeOccupancy = false,
            NumberOfDaysUnoccupiedPerWeek = 0,
            NumberOfTimesLetInAYear = 0
        };

        request.Building = new Building
        {
            PropertyType = enumConverters.ConvertPropertyType(state.PropertyType),
            PropertySubType = PropertySubType.DetachedHouse,
            ConstructionDate = new DateTime(Convert.ToInt32(state.YearBuilt), 01,
01, 00, 00, 00),
            ListedBuilding = false,
            RoofConstruction = RoofConstructionType.Standard,
            WallConstruction = WallConstructionType.Unknown,
            RoofPercentage = 0,
            NumberOfBedrooms = (int)state.NumberOfBedrooms,
            NumberOfBathrooms = 3,
            NumberOfSmokeDetectors = 2,
            Alarm = new Alarm { AlarmType = AlarmType.Unspecified },
            Locks = true,
            NeighbourhoodWatchInArea = true,
            Basement = false,
```

```
                HeatingType = HeatingType.Electric,
                BuildingSize = 0,
                BuildingSizeUnitOfMeasurement = UnitOfMeasurement.Unknown,
                GarageSize = 0,
                GarageSizeUnitOfMeasurement = UnitOfMeasurement.Unknown,
                FreeFromFlooding = true,
                FreeFromGroundHeave = true,
                FreeFromLandslip = true,
                FreeFromSubsidence = true,
                GoodRepair = true,
                SafeInstalled = false,
                UndertakeToMaintain = false
            };

            request.RiskAddress = new Address
            {
                StreetName = state.FirstLineOfAddress,
                Town = state.Town,
                County = state.County,
                FreeText1 = $"{state.FirstLineOfAddress}, {state.Town},
{state.County}",
                AddressMatchResults = new AddressMatchResult[]
                {
                    new AddressMatchResult
                    {
                        ProvidedBy = AddressLookupProvider.Gamma,
                        GeoCode = "40291613",
                        MatchType = "region",
                        Reference = "4IZJT7KP6X734AQK",
                        MatchLevel = "700",
                        IsFallbackResult = false,
                        LookupResponse =
                            "<![CDATA[&lt;location type='region'
territory='SPIKE_GAMMA' score='99.99'
xmlns='http://service.autoaddress.ie/'&gt;&lt;point x='275383.86' y='138100.57' coord-
sys='ING' /&gt;&lt;info ecadId='1110030370' eircode=' Autoaddressid='4IZJT7KP6X734AQK'
geover='Q117' geotype='L' georef='40291613' name='' text='Dranagh,Saint Mullins,Co.
Carlow' addr1='Dranagh' addr2='Saint Mullins' addr3='Co. Carlow' matchLevel='700'
matchResult'100' aa2MatchLevel='7' aa2MatchResult='300' smallarea='017020001'
ecadSmallarea='48' /&gt;&lt;/location&gt;]]>"
                    }
                }
            };

            request.Risks[0] = new Risk
            {
                Group = RateBreakdownGroup.HouseStructure,
                SumInsured = 300000
            };
            request.Risks[1] = new Risk
            {
                Group = RateBreakdownGroup.HouseContents,
                SumInsured = 25000
            };

            request.HomeRequestSource = HomeRequestSource.eQuote;
            request.QuoteReference = "NOV17-Y8AONF";
            request.FullQuoteRequest = false;

            return request;
        }
    }
```

```
}
```

MotorQuote.cs

```
using System;

using System.Configuration;

using System.Globalization;

using QuotingBot.Common.Enums;

using QuotingBot.DAL.Repository.Errors;

using QuotingBot.Common.RelayFullCycleMotorService;


namespace QuotingBot.Models.Motor

{

   [Serializable]

   public class MotorQuote

   {

      public static Common.RelayFullCycleMotorService.RelayFullCycleMotorService motorService =
new Common.RelayFullCycleMotorService.RelayFullCycleMotorService();

      private static readonly string Connection =
ConfigurationManager.ConnectionStrings["QuotingBot"].ConnectionString;

      private static readonly ErrorRepository _errorRepository = new ErrorRepository(Connection);

      public static EnumConverters enumConverters = new EnumConverters();

      public string VehicleRegistration;

      public string VehicleValue;

      public string AreaVehicleIsKept;

      public string FirstName;

      public string LastName;

      public string DateOfBirth;

      public LicenceType? LicenceType;

      public NoClaimsDiscount? NoClaimsDiscount;

      public string PrimaryContactNumber;

      public string EmailAddress;

      public Vehicle Vehicle = new Vehicle();


      public static Vehicle GetVehicle(string vehicleRegistration)
```

```
    {
        var vehicle = new Vehicle();
        try
        {
            vehicle.AbiCode = motorService.GetVehicleLookup(
                vehicleRegistration,
                string.Empty,
                string.Empty,
                string.Empty,
                string.Empty,
                string.Empty,
                string.Empty,
                string.Empty,
                string.Empty,
                string.Empty,
                "RE0098",
                "relay1:0099",
                VehicleLookup.Motor).ABICode;

            if (!string.IsNullOrEmpty(vehicle.AbiCode))
            {
                vehicle = GetVehicleDetails(vehicle.AbiCode);
            }
        }
        catch (Exception exception)
        {
            _errorRepository.LogError(DateTime.Now.ToString(new CultureInfo("en-GB")),
exception.ToString());
            throw;
        }
```

```
            return vehicle;
        }

        private static Vehicle GetVehicleDetails(string ABICode)
        {
            var vehicle = new Vehicle();

            try
            {
                var vehicleLookupItem = motorService.GetVehicleDetailsABI(ABICode);
                vehicle.AbiCode = ABICode;
                vehicle.Description = vehicleLookupItem.Description;
                vehicle.Manufacturer = vehicleLookupItem.Manufacturer;
                vehicle.Model = vehicleLookupItem.Model;
                vehicle.BodyType = vehicleLookupItem.BodyType;
                vehicle.EngineCapacity = vehicleLookupItem.EngineCapacity;
                vehicle.NumberOfDoors = vehicleLookupItem.NumberDoors;
                vehicle.FuelType = vehicleLookupItem.FuelType;
                vehicle.YearOfFirstManufacture = vehicleLookupItem.YearOfFirstManufacture;
            }
            catch(Exception exception)
            {
                _errorRepository.LogError(DateTime.Now.ToString(new CultureInfo("en-GB")),
exception.ToString());
                throw;
            }

            return vehicle;
        }

        public static IrishMQRiskInfo BuildIrishMQRiskInfo(MotorQuote state)
```

```
{
    var riskInfo = new IrishMQRiskInfo();
    riskInfo.Driver = new IrishDriverInfo[1];
    riskInfo.Vehicle = new IrishVehicleInfo[1];
    riskInfo.Cover = new IrishCoverInfo[1];

    var driver = new IrishDriverInfo
    {
        PRN = 1,
        RelationshipToProposer = "Z",
        DriverLicenceNumber = "550956042",
        Title = "005",
        Forename = state.FirstName,
        Surname = state.LastName,
        Sex = "M",
        MaritalStatus = "M",
        LicenceType = enumConverters.ConvertLicenceType(state.LicenceType),
        LicenceCountry = "IE",
        ProsecutionPending = false,
        LicenceRestrictionInd = false,
        QualificationsInd = false,
        NonMotoringConviction = false,
        PrevRefusedCover = false,
        OtherVehicleOwned = false,
        PrevRestrictiveTerms = false,
        RegisteredDisabled = false,
        ClaimsIndicator = false,
        PenaltyPointsIndicator = false,
        ConvictionsInd = false,
        MedicalConditionsInd = false,
        ResidentOutsideIreland = false,
```

```
    PermResident = true,
    NonDrinker = false,
    TempAdditionalDriver = false,
    DateOfBirth = Convert.ToDateTime(state.DateOfBirth, new CultureInfo("en-GB")),
    IrelandResidencyDate = new DateTime(2000, 04, 11, 02, 00, 00),
    IrelandLicenceDate = new DateTime(2014, 08, 28, 02, 00, 00),
    NameddriverNCDClaimedYears = 6,
    ResidentWithProposer = false,
    FullTimeUseOfOtherCar = false,
    IsResidentWithProposer = false,
    PrevImposedTerms = false,
    Occupation = new IrishOccupationInfo[]
    {
      new IrishOccupationInfo
      {
        FullTimeEmployment = true,
        OccupationCode = "SBB",
        EmployersBusiness = "120",
        EmploymentType = "E"
      }
    },
    DrivesVehicle = new IrishDrivesVehicleInfo[]
    {
      new IrishDrivesVehicleInfo
      {
        VehicleReferenceNumber = 1,
        DrivingFrequency = "M",
        Use = "4"
      }
    }
  };
```

```
riskInfo.Proposer = new IrishProposerInfo
{
   ProposerType = enmProposerType.eIndividual,
   TitleCode = "005",
   Title = "Mr.",
   ForeName = state.FirstName,
   SurName = state.LastName,
   Sex = "M",
   MaritalStatus = "M",
   DateOfBirth = Convert.ToDateTime(state.DateOfBirth, new CultureInfo("en-GB")),
   Address = new IrishAddressInfo
   {
      Line1 = "1 Main Street",
      Line2 = "Donegal",
      Line3 = "County Donegal",
      GeoCode = "38443614",
      MatchType = "subbuilding",
      MatchLevel = "100",
      RatingFactor = "1.391",
      MRACode = "MRA268067012",
      SmallAreaIdentifier = 5354,
      EcadIdentifier = 1700378046,
      EcadMatchLevelCode = "2",
      EcadMatchResultCode = "100",
      Eircode = "D11F6E5",
      ProvidedBy = AddressProvider.Gamma
   },
   Contact = new IrishContactInfo
   {
      Home = state.PrimaryContactNumber,
```

```
            Email = state.EmailAddress
        },
        NCD = new IrishNCDInfo
        {
            ClaimedYearsEarned =
enumConverters.ConvertNoClaimsDiscount(state.NoClaimsDiscount),
            DrivingExperienceYears = 0,
            ClaimedCountry = "IE",
            ClaimedInsurer = "029",
            PreviousPolicyNumber = "123456789",
            DrivingExperiencePolicyExpiryDate = DateTime.Now.AddDays(1),
            ClaimedDiscountType = "S",
            ClaimedBonusProtectionType = "F",
            ClaimedProtectedInd = false,
            ProtectionRequiredInd = true,
            DrivingExperienceProvenInd = true,
            ClaimedProvenInd = false,
            PreviousPolicyExpiryDate = DateTime.Now.AddDays(-5),
            RebrokeYearsProvided = false,
            RebrokeYears = 0
        },
        YearsAtHomeAddress = 0,
        HomeownerInd = "N"
    };
    riskInfo.Policy = new IrishPolicyInfo
    {
        PolicyNumber = "QWERTY12345",
        StartTime = "000100",
        EndTime = "120000",
        PreviousInsurer = "029",
        QuoteAuthor = "RLY",
```

```
    CurrencyRequired = "EUR",
    InceptionDate = DateTime.Now,
    StartDate = DateTime.Now,
    EndDate = DateTime.Now.AddYears(1),
    CurrentYear = DateTime.Now.Year,
    PreviouslyInsuredInd = true,
    SecondCarQuotationInd = false
};

riskInfo.Driver[0] = driver;
riskInfo.Vehicle[0] = new IrishVehicleInfo
{
    PRN = 1,
    Value = Convert.ToInt32(state.VehicleValue),
    AnnualMilage = 10000,
    BusinessMileage = 0,
    PleasureMileage = 10000,
    NonStandardAudioValue = 0,
    CarPhoneValue = 0,
    NoDriversFullLicence = 1,
    NoOfSeats = 5,
    ManufacturedYear = 2005,
    FirstRegdYear = 2005,
    ModelCode = state.Vehicle.AbiCode,
    ModelName = state.Vehicle.Description,
    KeptAt = "HA",
    AreaKeptAt = "DX11",
    CubicCapacity = state.Vehicle.EngineCapacity.ToString(),
    BodyType = "5",
    OvernightLocation = "2",
    AreaRating = "DX11",
```

```
            Owner = "1",
            RegistrationNo = state.VehicleRegistration,
            RegisteredKeeper = "1",
            DateManufactured = new DateTime(state.Vehicle.YearOfFirstManufacture, 01, 01, 02, 00,
00),
            DateFirstRegistered = new DateTime(state.Vehicle.YearOfFirstManufacture, 01, 01, 02, 00,
00),
            DatePurchased = new DateTime(2017, 05, 01, 02, 00, 00),
            ModifiedInd = false,
            IrelandRegistered = true,
            Imported = false,
            SecurityDeviceInd = true,
            TrailerInd = false,
            SecondCarInd = false,
            TemporaryAddVehicle = false,
            TemporarySubInd = false,
            LeftOrRightHandDrive = (char) 82,
            ReferenceNumber = 1,
            Security = new IrishSecurityInfo
            {
               Type = "1002"
            },
            Uses = new IrishUsesInfo
            {
               Code = "4"
            },
            DrivenBy = new IrishDrivenByInfo[]
            {
               new IrishDrivenByInfo
               {
                  DriverReferenceNumber = 1,
                  DrivingFrequency = "M"
```

```
        },
        new IrishDrivenByInfo()
        {
            DriverReferenceNumber = 2,
            DrivingFrequency = "F"
        }
    },
    VehicleType = 0
};
riskInfo.Cover[0] = new IrishCoverInfo
{
    Code = "01",
    PeriodUnits = "2",
    Period = "12",
    CertificateNumber = "0",
    StartTime = "000100",
    StartDate = DateTime.Now.AddDays(1),
    ExpiryDate = DateTime.Now.AddYears(1),
    RequiredDrivers = "5",
    VehicleRefNo = 1,
    TotalTempMTA = 0,
    TotalTempMTAInForce = 0,
    TotalTempAddDriverInForce = 0,
    TotalTempAddDriver = 0,
    TotalTempAddVehicle = 0,
    TotalTempSub = 0,
    VoluntaryExcess = 300,
    WindscreenLimit = 0
};
riskInfo.Intermediary = new IntermediaryInfo
{
```

```
        Name = "RE0668",
        Number = 0,
        RIAccountIdentifier = "relay1:0099"
    };
    riskInfo.TransactionDetail = new TransactionDetails
    {
        BrokerFee = 0
    };
    riskInfo.DiscountInfo = new IrishDiscountInfo
    {
        IsWebQuote = false,
        WebDiscountPercentage = 0
    };
    return riskInfo;
}

public static MessageRequestInfo BuildMessageRequestInfo()
{
    var messageRequestInfo = new MessageRequestInfo
    {
        BreakdownsSpecified1 = new BreakdownsSpecified
        {
            BreakdownSpecified1 = new BreakdownType[]
            {
                BreakdownType.ExcessItems
            }
        }
    };

    return messageRequestInfo;
}
```

```
    }
}
```

Vehicle.cs

```
using System;

namespace QuotingBot.Models.Motor
{
    [Serializable]
    public class Vehicle
    {
        public string Manufacturer { get; set; }
        public string Model { get; set; }
        public string BodyType { get; set; }
        public int NumberOfDoors { get; set; }
        public int YearOfFirstManufacture { get; set; }
        public int EngineCapacity { get; set; }
        public string FuelType { get; set; }
        public string Description { get; set; }
        public string AbiCode { get; set; }
    }
}
```

EmailHandler.cs

```
using System;
using System.ComponentModel;
using System.Configuration;
using System.Net;
using System.Net.Mail;
using QuotingBot.Common.RelayFullCycleMotorService;
using QuotingBot.Common.RelayHouseholdService;
using QuotingBot.Common.Enums;

namespace QuotingBot.Common.Email
{
   public class EmailHandler
   {
      public EmailHandler() { }
      private static void SendCompletedCallback(object sender, AsyncCompletedEventArgs e)
      {
         // Get the unique identifier for this asynchronous operation.
         String token = (string)e.UserState;

         if (e.Error != null)
         {
            Console.WriteLine("[{0}] {1}", token, e.Error.ToString());
         }
         else
         {
            Console.WriteLine("Message sent.");
         }
      }

      private static SmtpClient SetupSmtpClient()
```

```
{
    var mailServerAddress = ConfigurationManager.AppSettings["MailServerAddress"];
    var mailServerUser = ConfigurationManager.AppSettings["MailServerUser"];
    var mailServerPassword = ConfigurationManager.AppSettings["MailServerPassword"];

    var client =
        new SmtpClient(mailServerAddress)
        {
            Credentials = new NetworkCredential(mailServerUser, mailServerPassword)
        };

    return client;
}
public static void SendEmailToUser(string toEmail, string toName, string body)
{
    var emailSenderAddress = ConfigurationManager.AppSettings["SenderEmailAddress"];
    var emailSenderName = ConfigurationManager.AppSettings["EmailSenderName"];

    var emailFrom = new MailAddress(emailSenderAddress, emailSenderName);
    var emailTo = new MailAddress(toEmail, toName);
    var message = new MailMessage(emailFrom, emailTo)
    {
        Body = body,
        Subject = "Insurace Quote",
        IsBodyHtml = true
    };

    var client = SetupSmtpClient();
    // Set the method that is called back when the send operation ends.
    client.SendCompleted += new
    SendCompletedEventHandler(SendCompletedCallback);
```

```
        // The userState can be any object that allows your callback
        // method to identify this send operation.
        // For this example, the userToken is a string constant.
        const string userState = "sending message";
        client.SendAsync(message, userState);
    }

    public static string BuildHomeEmailBodyForUser(HomeQuoteWebServiceResult[]
responseQuotes,
        string firstName, string lastName, string contactNumber, string emailAddress,
        string firstLineOfAddress, string town, string county, string propertyType,
        string residenceType, string yearBuilt, string numberOfBedrooms)
    {
        string body;

        body = $"Hi {firstName},<br><br>";
        body += "Thanks for getting your home insurance quote with us.<br><br>";
        body += "We've listed the quotes you received.<br><br>";
        body += "<table border=\"1\"><tbody>";
        body += "<tr><th>Insurer</th><th>Scheme</th><th>Total</th></tr>";

        foreach (var quote in responseQuotes)
        {
            if (quote.NetPremium > 0)
            {
                body +=
$"<tr><td>{quote.InsurerName}</td><td>{quote.SchemeName}</td><td>€{quote.NetPremium}</td
></tr>";
            }
        }
```

```
            body += "</tbody></table><br><br>";

            body += "Entered risk details:<br>";
            body += $"<strong>Name:</strong> {firstName} {lastName}<br>";
            body += $"<strong>Contact Number:</strong> {contactNumber}<br>";
            body += $"<strong>Email:</strong> {emailAddress}<br>";
            body += $"<strong>Address Line 1:</strong> {firstLineOfAddress}<br>";
            body += $"<strong>Town:</strong> {town}<br>";
            body += $"<strong>County:</strong> {county}<br>";
            body += $"<strong>Property:</strong> {propertyType}<br>";
            body += $"<strong>Residence:</strong> {residenceType}<br>";
            body += $"<strong>Year Built:</strong> {yearBuilt}<br>";
            body += $"<strong>No. of Bedrooms:</strong> {numberOfBedrooms}<br><br>";

            body += "Thanks,<br>";
            body += $"Ava - your friendly Quoting Bot {Emoji.GrinningFace.GetDescription()}";

            return body;
        }

        public static string BuildMotorEmailBodyForUser(IrishMQResultsBreakdown[] quotes,
            string firstName, string lastName, string dateOfBirth, string contactNumber, string
emailAddress,
            string vehicleRegistration, string vehicleDescription, string vehicleValue, string
areaVehicleKept,
            string licenceType, string noClaimsDiscountYears)
        {
            string body;

            body = $"Hi {firstName},<br><br>";
            body += "Thanks for getting your home insurance quote with us.<br><br>";
```

```
        body += "We've listed the quotes you received.<br><br>";
        body += "<table border=\"1 solid\"><tbody>";
        body += "<tr><th>Insurer</th><th>Total</th></tr>";

        foreach (var quote in quotes)
        {
           if (quote.Premium.TotalPremium > 0)
           {
              body +=
$"<tr><td>{quote.Premium.SchemeName}</td><td>€{quote.Premium.TotalPremium}</td></tr>";
           }
        }

        body += "</tbody></table><br><br>";

        body += "Entered risk details:<br>";
        body += $"<strong>Name:</strong> {firstName} {lastName}<br>";
        body += $"<strong>Date of Birth:</strong> {dateOfBirth}<br>";
        body += $"<strong>Contact Number:</strong> {contactNumber}<br>";
        body += $"<strong>Email:</strong> {emailAddress}<br>";
        body += $"<strong>Vehicle Registration:</strong> {vehicleRegistration}<br>";
        body += $"<strong>Vehicle Description:</strong> {vehicleDescription}<br>";
        body += $"<strong>Vehilce Value:</strong> €{vehicleValue}<br>";
        body += $"<strong>Area Vehilce Kept:</strong> {areaVehicleKept}<br>";
        body += $"<strong>Licence:</strong> {licenceType}<br>";
        body += $"<strong>No Claims Discount:</strong> {noClaimsDiscountYears}<br><br>";

        body += "Thanks,<br>";
        body += $"Ava - your friendly Quoting Bot {Emoji.GrinningFace.GetDescription()}";

        return body;
```

```
    }

    public static void SendEmailToBroker(string toEmail, string toName, string body)
    {
        var emailSenderAddress = ConfigurationManager.AppSettings["SenderEmailAddress"];
        var emailSenderName = ConfigurationManager.AppSettings["EmailSenderName"];

        var emailFrom = new MailAddress(emailSenderAddress, emailSenderName);
        var emailTo = new MailAddress(toEmail, toName);
        var message = new MailMessage(emailFrom, emailTo)
        {
            Body = body,
            Subject = "Customer Insurace Quote",
            IsBodyHtml = true
        };

        var client = SetupSmtpClient();
        // Set the method that is called back when the send operation ends.
        client.SendCompleted += new
            SendCompletedEventHandler(SendCompletedCallback);

        // The userState can be any object that allows your callback
        // method to identify this send operation.
        // For this example, the userToken is a string constant.
        const string userState = "sending message";
        client.SendAsync(message, userState);
    }

    public static string BuildMotorEmailBodyForBroker(IrishMQResultsBreakdown[] quotes,
        string firstName, string lastName, string dateOfBirth, string contactNumber, string
emailAddress,
```

```
        string vehicleRegistration, string vehicleDescription, string vehicleValue, string
areaVehicleKept,
        string licenceType, string noClaimsDiscountYears)
    {
        string body;

        body = $"Hi,<br><br>";
        body += "An insurance quote was given through the chatbot.<br><br>";
        body += "We've listed the quotes given.<br><br>";
        body += "<table border=\"1 solid\"><tbody>";
        body += "<tr><th>Insurer</th><th>Total</th></tr>";

        foreach (var quote in quotes)
        {
          if (quote.Premium.TotalPremium > 0)
          {
            body +=
$"<tr><td>{quote.Premium.SchemeName}</td><td>€{quote.Premium.TotalPremium}</td></tr>";
          }
        }

        body += "</tbody></table><br><br>";

        body += "Entered risk details:<br>";
        body += $"<strong>Name:</strong> {firstName} {lastName}<br>";
        body += $"<strong>Date of Birth:</strong> {dateOfBirth}<br>";
        body += $"<strong>Contact Number:</strong> {contactNumber}<br>";
        body += $"<strong>Email:</strong> {emailAddress}<br>";
        body += $"<strong>Vehicle Registration:</strong> {vehicleRegistration}<br>";
        body += $"<strong>Vehicle Description:</strong> {vehicleDescription}<br>";
        body += $"<strong>Vehilce Value:</strong> €{vehicleValue}<br>";
        body += $"<strong>Area Vehilce Kept:</strong> {areaVehicleKept}<br>";
```

```
        body += $"<strong>Licence:</strong> {licenceType}<br>";
        body += $"<strong>No Claims Discount:</strong> {noClaimsDiscountYears}<br><br>";

        body += "Thanks,<br>";
        body += $"Ava - your friendly Quoting Bot {Emoji.GrinningFace.GetDescription()}";

        return body;
    }

    public static string BuildHomeEmailBodyForBroker(HomeQuoteWebServiceResult[]
responseQuotes,
        string firstName, string lastName, string contactNumber, string emailAddress,
        string firstLineOfAddress, string town, string county, string propertyType,
        string residenceType, string yearBuilt, string numberOfBedrooms)
    {
        string body;

        body = $"Hi,<br><br>";
        body += "An insurance quote was given through the chatbot.<br><br>";
        body += "We've listed the quotes given.<br><br>";
        body += "<table border=\"1\"><tbody>";
        body += "<tr><th>Insurer</th><th>Scheme</th><th>Total</th></tr>";

        foreach (var quote in responseQuotes)
        {
            if (quote.NetPremium > 0)
            {
                body +=
$"<tr><td>{quote.InsurerName}</td><td>{quote.SchemeName}</td><td>€{quote.NetPremium}</td
></tr>";
            }
        }
```

```
            body += "</tbody></table><br><br>";

            body += "Entered risk details:<br>";
            body += $"<strong>Name:</strong> {firstName} {lastName}<br>";
            body += $"<strong>Contact Number:</strong> {contactNumber}<br>";
            body += $"<strong>Email:</strong> {emailAddress}<br>";
            body += $"<strong>Address Line 1:</strong> {firstLineOfAddress}<br>";
            body += $"<strong>Town:</strong> {town}<br>";
            body += $"<strong>County:</strong> {county}<br>";
            body += $"<strong>Property:</strong> {propertyType}<br>";
            body += $"<strong>Residence:</strong> {residenceType}<br>";
            body += $"<strong>Year Built:</strong> {yearBuilt}<br>";
            body += $"<strong>No. of Bedrooms:</strong> {numberOfBedrooms}<br><br>";


            body += "Thanks,<br>";
            body += $"Ava - your friendly Quoting Bot {Emoji.GrinningFace.GetDescription()}";

            return body;
        }
    }
}
```

Emoji.cs

```
using System;
using System.ComponentModel;

namespace QuotingBot.Common.Enums
{
    [Serializable]
    public enum Emoji
    {
        [Description("\U0001F604")]
        GrinningFace,
        [Description("\U0001F914")]
        ThinkingFace,
        [Description("\U0001F44D")]
        ThumbsUp,
        [Description("\U0001F698")]
        Car,
        [Description("\U0001F3E1")]
        House,
        [Description("\U0001F4E7")]
        Email
    }
}
```

EnumConverters.cs

```
using System;

namespace QuotingBot.Common.Enums
{
    [Serializable]
    public class EnumConverters
    {
        public EnumConverters() { }

        public string ConvertLicenceType(object value)
        {
            switch (value)
            {
                case LicenceType.FullIrish:
                    return "C";
                case LicenceType.ProvisionalIrish:
                    return "B";
                case LicenceType.FullEU:
                    return "F";
                case LicenceType.FullUK:
                    return "C";
                case LicenceType.Foreign:
                    return "I";
                case LicenceType.InternationalLicence:
                    return "N";
                case LicenceType.LearnerPermit:
                    return "G";
                default:
                    return string.Empty;
            }

        }

        public int ConvertNoClaimsDiscount(object value)
        {
            switch (value)
            {
                case NoClaimsDiscount.Zero:
                    return 0;
                case NoClaimsDiscount.One:
                    return 1;
                case NoClaimsDiscount.Two:
                    return 2;
                case NoClaimsDiscount.Three:
                    return 3;
                case NoClaimsDiscount.Four:
                    return 4;
                case NoClaimsDiscount.Five:
                    return 5;
                case NoClaimsDiscount.Six:
                    return 6;
                case NoClaimsDiscount.Seven:
                    return 7;
                case NoClaimsDiscount.Eight:
                    return 8;
                case NoClaimsDiscount.NineOrMore:
                    return 9;
                default:
                    return 0;
            }
        }
```

```
        public RelayHouseholdService.PropertyType ConvertPropertyType(PropertyType?
propertyType)
        {
            switch (propertyType)
            {
                case PropertyType.Bungalow:
                    return RelayHouseholdService.PropertyType.Bungalow;
                case PropertyType.DetachedHouse:
                    return RelayHouseholdService.PropertyType.DetachedHouse;
                case PropertyType.Flat:
                    return RelayHouseholdService.PropertyType.Flat;
                case PropertyType.SemiDetachedHouse:
                    return RelayHouseholdService.PropertyType.SemiDetachedHouse;
                case PropertyType.TerracedHouse:
                    return RelayHouseholdService.PropertyType.TerracedHouse;
                default:
                    return RelayHouseholdService.PropertyType.Unknown;
            }
        }

        public RelayHouseholdService.ResidenceType ConvertResidencyType(ResidenceType?
residenceType)
        {
            switch (residenceType)
            {
                case ResidenceType.OwnerOccupied:
                    return RelayHouseholdService.ResidenceType.OwnerOccupied;
                case ResidenceType.RentedFamily:
                    return RelayHouseholdService.ResidenceType.RentedFamily;
                case ResidenceType.RentedStudents:
                    return RelayHouseholdService.ResidenceType.RentedStudents;
                default:
                    return RelayHouseholdService.ResidenceType.Unspecified;
            }
        }
    }
}
```

EnumExtension.cs

```
using System;
using System.ComponentModel;
using System.Reflection;

namespace QuotingBot.Common.Enums
{
    public static class EnumExtension
    {
        public static string GetDescription(this Enum value)
        {
            FieldInfo field = value.GetType().GetField(value.ToString());
            object[] attribs = field.GetCustomAttributes(typeof(DescriptionAttribute),
true);
            return attribs.Length > 0 ? ((DescriptionAttribute)attribs[0]).Description
: string.Empty;
        }
    }
}
```

LicenceType.cs

```
using System;
using System.ComponentModel;

namespace QuotingBot.Common.Enums
{
    [Serializable]
    public enum LicenceType
    {
        [Description("Full Irish")]
        FullIrish,
        [Description("Provisional Irish")]
        ProvisionalIrish,
        [Description("Full EU")]
        FullEU,
        [Description("Full UK")]
        FullUK,
        [Description("Foreign Licence")]
        Foreign,
        [Description("International Licence")]
        InternationalLicence,
        [Description("Learner Permit")]
        LearnerPermit
    }
}
```

NoClaimsDiscount.cs

```
using System;
using System.ComponentModel;

namespace QuotingBot.Common.Enums
{
    [Serializable]
    public enum NoClaimsDiscount
    {
        [Description("0")]
        Zero,
        [Description("1")]
        One,
        [Description("2")]
        Two,
        [Description("3")]
        Three,
        [Description("4")]
        Four,
        [Description("5")]
        Five,
        [Description("6")]
        Six,
        [Description("7")]
        Seven,
        [Description("8")]
        Eight,
        [Description("9+")]
        NineOrMore
    }
}
```

PropertyType.cs

```
using System;
using System.ComponentModel;

namespace QuotingBot.Common.Enums
{
    [Serializable]
    public enum PropertyType
    {
        [Description("Bungalow")]
        Bungalow,
        [Description("Detached House")]
        DetachedHouse,
        [Description("Flat")]
        Flat,
        [Description("Semi-Detached House")]
        SemiDetachedHouse,
        [Description("Terraced House")]
        TerracedHouse
    }
}
```

ResidenceType.cs

```
using System;
using System.ComponentModel;

namespace QuotingBot.Common.Enums
{
    [Serializable]
    public enum ResidenceType
    {
        [Description("Owner Occupied")]
        OwnerOccupied,
        [Description("Family Rental")]
        RentedFamily,
        [Description("Student Rental")]
        RentedStudents
    }
}
```

Formatter.cs

```
using System;

namespace QuotingBot.Common.Helpers
{
    [Serializable]
    public class Formatter
    {
        public Formatter() { }

        public string CapitilizeFirstLetter(string value)
        {
            char[] characters = value.ToCharArray();
            characters[0] = char.ToUpper(characters[0]);

            return new string(characters);
        }
    }
}
```

Validation.cs

```
using Microsoft.Bot.Builder.FormFlow;
using System;
using System.Configuration;
using System.Globalization;
using System.Text.RegularExpressions;
using QuotingBot.DAL.Repository.Errors;
using QuotingBot.Common.Enums;
using System.Linq;

namespace QuotingBot.Common.Helpers
{
    [Serializable]
    public class Validation
    {
        private static readonly string Connection =
ConfigurationManager.ConnectionStrings["QuotingBot"].ConnectionString;
        private static readonly ErrorRepository ErrorRepository = new
ErrorRepository(Connection);
        private static readonly RelayFullCycleMotorService.RelayFullCycleMotorService
MotorService = new RelayFullCycleMotorService.RelayFullCycleMotorService();
        private readonly Formatter _formatter = new Formatter();
        public Validation() { }

        public ValidateResult ValidateVehicleValue(object value)
        {
            var result = new ValidateResult
            {
                IsValid = false
            };

            if (decimal.TryParse(value.ToString(), out decimal returnValue))
            {
                result.IsValid = true;
                result.Value = Math.Round(returnValue,
MidpointRounding.AwayFromZero).ToString();
            }
            else
            {
                result.Feedback = $"The value {value} wasn't valid.  Make sure you
enter a number, like €2000.";
            }
            return result;
        }

        public ValidateResult ValidateFirstName(object value)
        {
            var firstName = value.ToString();
            var result = new ValidateResult
            {
                IsValid = false
            };

            if(!string.IsNullOrEmpty(firstName))
            {
                result.IsValid = true;
                result.Value = _formatter.CapitilizeFirstLetter(firstName);
            }
            else
            {
                result.Feedback = "You need to provide a first name to continue.";
            }
```

```
            return result;
        }

        public ValidateResult ValidateTown(object value)
        {
            var town = value.ToString();

            var result = new ValidateResult
            {
                IsValid = false
            };

            if (MotorService.GetAreaCodeList().Contains(town))
            {
                result.IsValid = true;
                result.Value = value.ToString();
            }
            else
            {
                result.Feedback = $"Oh dear...I don't recognise that town.  Can you
check the spelling of '{town}' or try an area close by? Thanks
{Emoji.ThumbsUp.GetDescription()}";
            }

            return result;
        }

        public ValidateResult ValidateCounty(object value)
        {
            var county = value.ToString();

            var result = new ValidateResult
            {
                IsValid = false
            };

            if (MotorService.GetCountyCodeList().Contains(county))
            {
                result.IsValid = true;
                result.Value = value.ToString();
            }
            else
            {
                result.Feedback = $"Oh dear...I don't recognise that county.  Can you
check the spelling of '{county}' or try an area close by? Thanks
{Emoji.ThumbsUp.GetDescription()}";
            }

            return result;
        }

        public ValidateResult ValidateYearBuilt(object value)
        {
            var result = new ValidateResult
            {
                IsValid = false
            };

            if (IsYearBuiltValid(value.ToString()) && int.TryParse(value.ToString(),
out int returnValue))
            {
```

```
                result.IsValid = true;
                result.Value = returnValue.ToString();
            }
            else
            {
                result.Feedback = $"The value {value} wasn't valid.  Make sure you
enter a year in 'YYYY' format, like 2018.";
            }
            return result;
        }

        private bool IsYearBuiltValid(string yearBuilt)
        {
            string validYearPattern = @"^[0-9]{4}$";
            Regex validYear = new Regex(validYearPattern);

            return validYear.IsMatch(yearBuilt);
        }

        public ValidateResult ValidateLastName(object value)
        {
            var lastName = value.ToString();
            var result = new ValidateResult
            {
                IsValid = false
            };

            if (!string.IsNullOrEmpty(lastName))
            {
                result.IsValid = true;
                result.Value = _formatter.CapitilizeFirstLetter(lastName);
            }
            else
            {
                result.Feedback = "You need to provide a last name to continue.";
            }

            return result;
        }

        public ValidateResult ValidateAreaVehicleIsKept(object value)
        {
            var area = value.ToString();

            var result = new ValidateResult
            {
                IsValid = false
            };

            if (MotorService.GetAreaCodeList().Contains(area) ||
MotorService.GetCountyCodeList().Contains(area))
            {
                result.IsValid = true;
                result.Value = value.ToString();
            }
            else
            {
                result.Feedback = $"Oh dear...I don't recognise that area.  Can you
check the spelling of '{area}' or try an area close by? Thanks {Emoji.ThumbsUp}";
            }

            return result;
```

```
        }

        public ValidateResult ValidateDateOfBirth(object value)
        {
            var result = new ValidateResult
            {
                IsValid = false
            };

            try
            {
                CultureInfo culture = new CultureInfo("en-GB");
                var date = Convert.ToDateTime(value, culture);

                if(IsProposerOfLegalDrivingAge(date))
                {
                    result.IsValid = true;
                    result.Value = value.ToString();
                }
                else
                {
                    result.Feedback = "Sorry, but we can't quote for anyone under the
age of 17";
                    return result;
                }
            }
            catch (Exception ex)
            {
                ErrorRepository.LogError(DateTime.Now.ToShortDateString(),
ex.InnerException.ToString());
                throw;
            }

            return result;
        }

        public ValidateResult ValidateEmailAddress(object value)
        {
            var result = new ValidateResult
            {
                IsValid = false
            };

            if(IsEmailAddressValid(value.ToString()))
            {
                result.IsValid = true;
                result.Value = value.ToString();
            }
            else
            {
                result.Feedback = $"Please enter a valid email address {Emoji.Email}";
            }

            return result;
        }

        private bool IsProposerOfLegalDrivingAge(DateTime dateOfBirth) => dateOfBirth
<= DateTime.Now.AddYears(-17);

        private bool IsEmailAddressValid(string emailAddress)
        {
            string validEmailPattern = @"\b[A-Z0-9._%+-]+@[A-Z0-9.-]+\.[A-Z]{2,}\b";
```

```
            Regex validEmailAddress = new Regex(validEmailPattern,
RegexOptions.IgnoreCase);

            return validEmailAddress.IsMatch(emailAddress);
        }

        public ValidateResult ValidateNumberOfBedrooms(object value)
        {
            var result = new ValidateResult
            {
                IsValid = false
            };

            if (int.TryParse(value.ToString(), out int returnValue))
            {
                if (returnValue >= 0 && returnValue <= 9)
                {
                    result.IsValid = true;
                    result.Value = returnValue.ToString();
                }
                else
                {
                    result.Feedback = $"Sorry, but we can't quote for {value}
bedrooms.";
                }
            }
            else
            {
                result.Feedback = $"Sorry, {value} wasn't valid number of bedrooms.";
            }
            return result;
        }
    }
}
```

Conversation.cs

```
namespace QuotingBot.DAL.Models
{
    public class Conversation
    {
        public string ConversationId { get; set; }
        public string UserId { get; set; }
        public string ConversationDate { get; set; }
        public string ConversationLog { get; set; }

        public Conversation(string conversationId, string userId, string
conversationDate, string conversationLog)
        {
            ConversationId = conversationId;
            UserId = userId;
            ConversationDate = conversationDate;
            ConversationLog = conversationLog;
        }
    }
}
```

Error.cs

```
using System;

namespace QuotingBot.DAL.Models
{
    public class Error
    {
        public string ConversationId { get; set; }
        public string UserId { get; set; }
        public string ConversationDate { get; set; }
        public string ConversationLog { get; set; }
        public string ErrorMessage { get; set; }

        public Error(string conversationId, string userId, string conversationDate,
string conversationLog, string errorMessage)
        {
            ConversationId = conversationId;
            UserId = userId;
            ConversationDate = conversationDate;
            ConversationLog = conversationLog;
            ErrorMessage = errorMessage;
        }
    }
}
```

QuoteRepository.cs

```
using Dapper;
using QuotingBot.Models;
using System.Data;
using System.Data.SqlClient;

namespace QuotingBot.DAL.Quotes
{
    public class QuoteRepository
    {
        private string ConnectionString { get; }

        public QuoteRepository(string connectionString) {
            ConnectionString = connectionString;
        }

        public async void StoreQuote(string conversationId, string quoteId, string
quoteInfo)
        {
            using (var connection = new SqlConnection(ConnectionString))
            {
                await connection.OpenAsync();
                var quote = new Quote
                (
                    conversationId,
                    quoteId,
                    quoteInfo
                );

                await connection.ExecuteAsync("usp_Add_Quote", quote, null, null,
CommandType.StoredProcedure);
            }
        }
    }
}
```

ConversationRepository.cs

```
using Dapper;
using QuotingBot.DAL.Models;
using QuotingBot.DAL.Repository.Errors;
using System;
using System.Data;
using System.Data.SqlClient;

namespace QuotingBot.DAL.Repository.Conversations
{
    public class ConversationRepository
    {
        private string Connection { get; }
        public ConversationRepository(string connection)
        {
            Connection = connection;
        }

        public async void StoreConversation(string conversationId, string userId,
string conversationDate, string conversationLog)
        {
            try
            {
                using (var connection = new SqlConnection(Connection))
                {
                    await connection.OpenAsync();
                    var conversation = new Conversation
                    (
                        conversationId,
                        userId,
                        conversationDate,
                        conversationLog
                    );

                    await connection.ExecuteAsync(
                        "usp_Add_Conversation",
                        conversation,
                        null, null,
                        CommandType.StoredProcedure);
                }
            }
            catch(Exception exception)
            {
                var errorRepository = new ErrorRepository(Connection);
                errorRepository.LogError(conversationId, userId,
DateTime.Now.ToString(), conversationLog, exception.ToString());
                throw;
            }
        }
    }
}
```

ErrorRepository.cs

```
using Dapper;
using QuotingBot.DAL.Models;
using System;
using System.Data;
using System.Data.SqlClient;

namespace QuotingBot.DAL.Repository.Errors
{
    public class ErrorRepository
    {
        private string Connection { get; }

        public ErrorRepository(string connection)
        {
            Connection = connection;
        }

        public async void LogError(string conversationId, string userId, string
conversationDate, string conversationLog, string errorMessage)
        {
            using (var connection = new SqlConnection(Connection))
            {
                await connection.OpenAsync();
                var error = new Error
                (
                    conversationId,
                    userId,
                    conversationDate,
                    conversationLog,
                    errorMessage
                );

                await connection.ExecuteAsync("usp_Add_Error", error, null, null,
CommandType.StoredProcedure);
            }
        }

        public async void LogError(string conversationDate, string errorMessage)
        {
            using (var connection = new SqlConnection(Connection))
            {
                await connection.OpenAsync();
                var quote = new Error
                (
                    Guid.Empty.ToString(),
                    Guid.Empty.ToString(),
                    conversationDate,
                    string.Empty,
                    errorMessage
                );

                await connection.ExecuteAsync("usp_Add_Error", quote, null, null,
CommandType.StoredProcedure);
            }
        }
    }
}
```

Program.cs

```
using System;
using System.Linq;
using System.Reflection;
using DbUp;

namespace QuotingBot.DbUp
{
    public static class Program
    {
        // -s "QuotingBotAlias" -d "QuotingBot" -u "QuotingBotDeployment" -p
"QuotingBotDeployment" "-create" "-createlogins" "-test"
        static int Main(string[] args)
        {
            var connectionString = args.FirstOrDefault()
                                    ?? "Server=PCONNOLLY\\SQL2014; Database=QuotingBot;
Trusted_connection=true";
            //?? "Server=DESKTOP-HL69CK9\\PCONNOLLY; Database=QuotingBot;
Trusted_connection=true";

            EnsureDatabase.For.SqlDatabase(connectionString);

            var upgrader = DeployChanges
                .To
                .SqlDatabase(connectionString)
                .WithScriptsEmbeddedInAssembly(Assembly.GetExecutingAssembly())
                .LogToConsole()
                .Build();

            var result = upgrader.PerformUpgrade();

            if (!result.Successful)
            {
                Console.ForegroundColor = ConsoleColor.Red;
                Console.WriteLine(result.Error);
                Console.ResetColor();
                return -1;
            }

            Console.ForegroundColor = ConsoleColor.Green;
            Console.WriteLine("Success!");
            Console.ResetColor();
            return 0;
        }
    }
}
```