Handling Failures and Input Errors in a Functional Way

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Traditional Approach to Handling Failures and Input Errors

Handle all input errors at the boundaries of the domain model

Catch all expected failures at the lowest level possible

```
public string RefillBalance(int customerId, decimal moneyAmount) {
    Customer customer = _database.GetById(customerId);
    customer.Balance += moneyAmount;
    _paymentGateway.ChargePayment(customer.BillingInfo, moneyAmount);
    _database.Save(customer);

    return "OK";
}
```

```
public string RefillBalance(int customerId, decimal moneyAmount) {
    if (!IsMoneyAmountValid(moneyAmount)) {
        return "Money amount is invalid";
    }
    Customer customer = _database.GetById(customerId);
    customer.Balance += moneyAmount;
    _paymentGateway.ChargePayment(customer.BillingInfo, moneyAmount);
    _database.Save(customer);

    return "OK";
}
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public string RefillBalance(int customerId, decimal moneyAmount) {
    if (!IsMoneyAmountValid(moneyAmount)) {
        return "Money amount is invalid";
    }
    Customer customer = _database.GetById(customerId);
    if (customer == null) {
        return "Customer is not found";
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    customer.Balance += moneyAmount;
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    }
    customer.Balance += moneyAmount;
    try {
        _paymentGateway.ChargePayment(customer.BillingInfo, moneyAmount);
    }
    catch (ChargeFailedException) {
        return "Unable to charge the credit card";
    }
    _database.Save(customer);

    return "OK";
}
```

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public string RefillBalance(int customerId, decimal moneyAmount) {
    if (!IsMoneyAmountValid(moneyAmount)) {
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    customer.Balance += moneyAmount;
    try {
        _paymentGateway.ChargePayment(customer.BillingInfo, moneyAmount);
    }
    catch (ChargeFailedException) {
        return "Unable to charge the credit card";
    }
    try {
        _database.Save(customer);
    }
    catch (SqlException) {
        _paymentGateway.RollbackLastTransaction();
        return "Unable to connect to the database";
    }

    return "OK";
}
```

```
public string RefillBalance(int customerId, decimal moneyAmount) {
    if (!IsMoneyAmountValid(moneyAmount)) {
        _logger.Log("Money amount is invalid");
        return "Money amount is invalid";
    }
    Customer customer = _database.GetById(customerId);
    if (customer == null) {
        _logger.Log("Customer is not found");
        return "Customer is not found";
    }
    customer.Balance += moneyAmount;
    try {
        _paymentGateway.ChargePayment(customer.BillingInfo, moneyAmount);
    }
    catch (ChargeFailedException) {
        _logger.Log("Unable to charge the credit card");
        return "Unable to charge the credit card";
    }
    try {
        _database.Save(customer);
    }
    catch (SqlException) {
        _paymentGateway.RollbackLastTransaction();
        _logger.Log("Unable to connect to the database");
        return "Unable to connect to the database";
    }
    _logger.Log("OK");
    return "OK";
}
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        _logger.Log("Unable to charge the credit card");
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    try {
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        _logger.Log("Unable to connect to the database");
        return "Unable to connect to the database";
    }
    _logger.Log("OK");
    return "OK";
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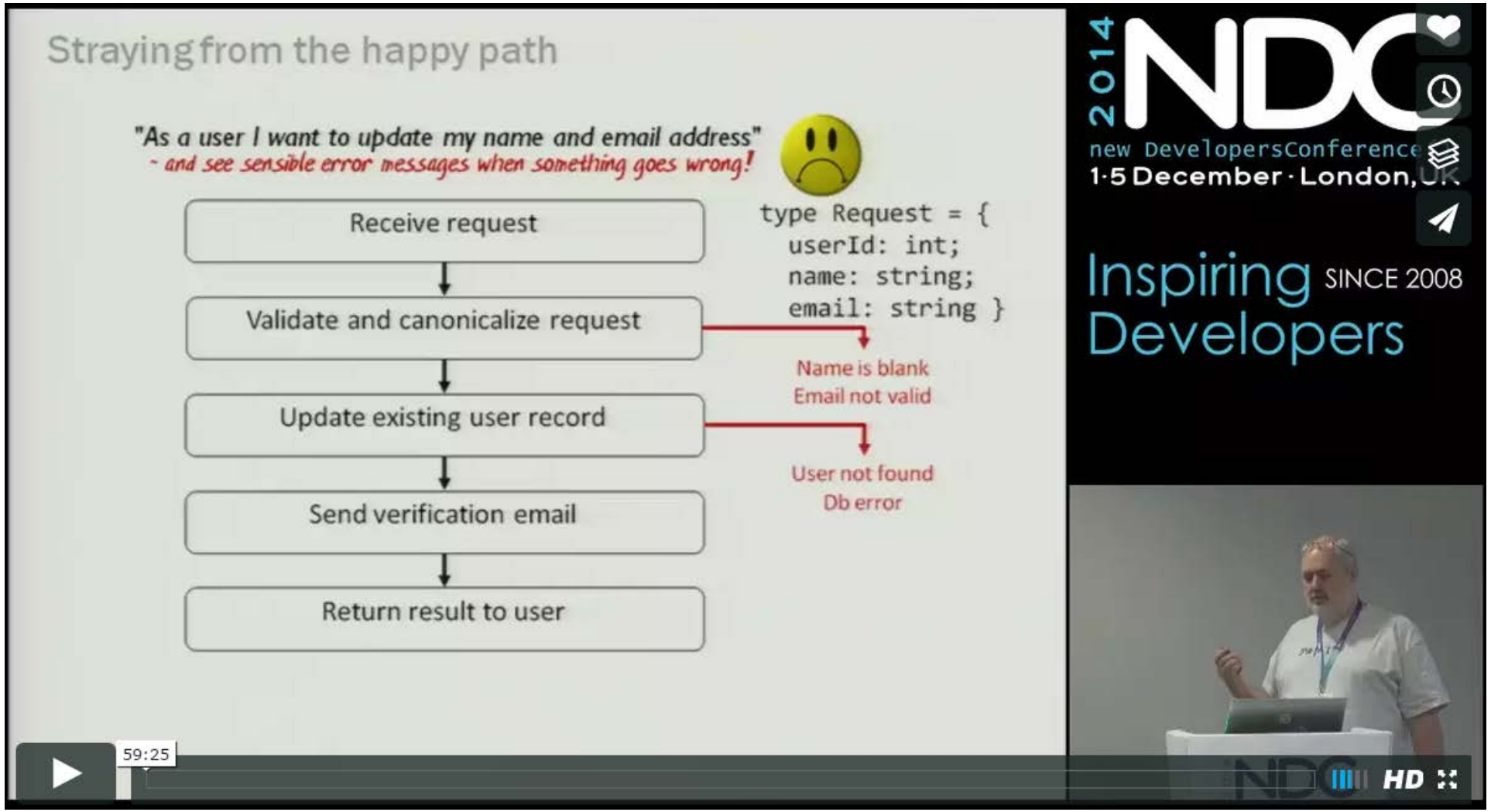
```

Introducing Railway-oriented Programming



https://vimeo.com/113707214

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```

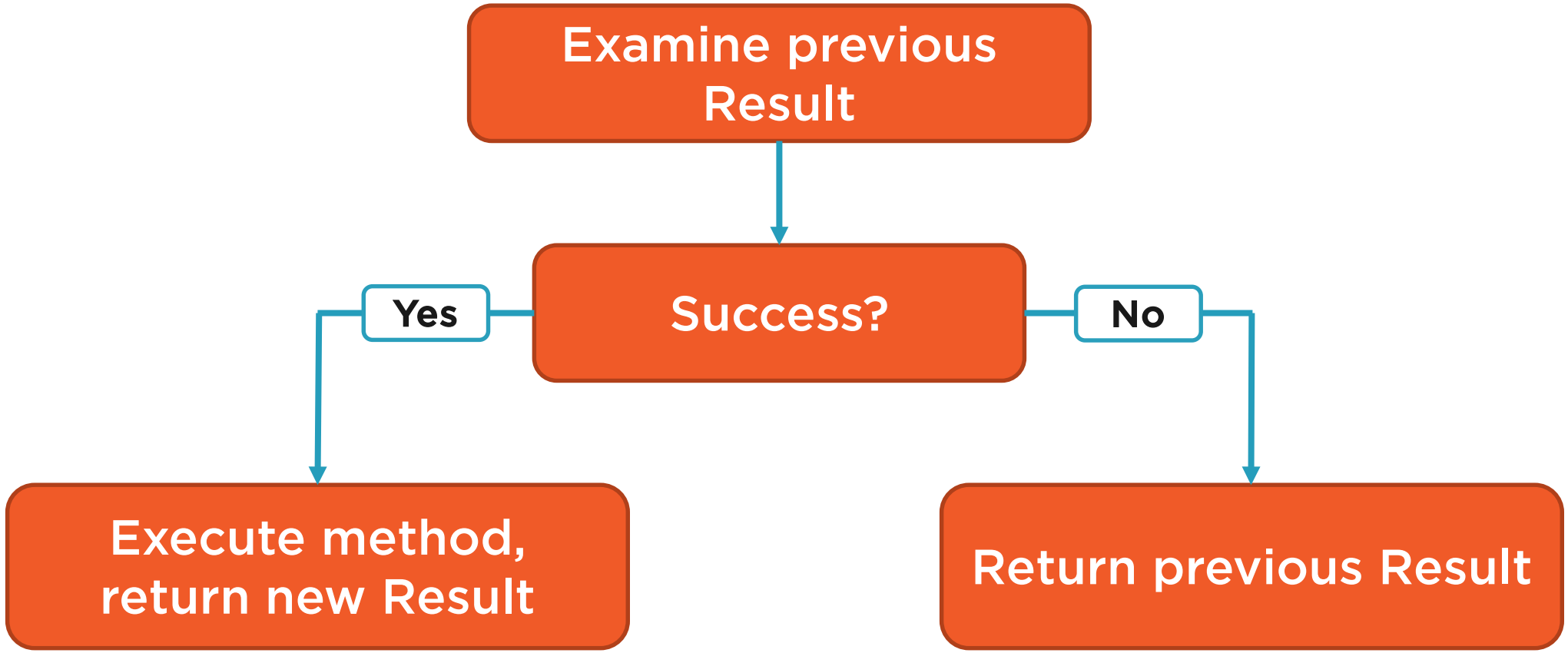
Introducing Railway-oriented Programming

OnSuccess

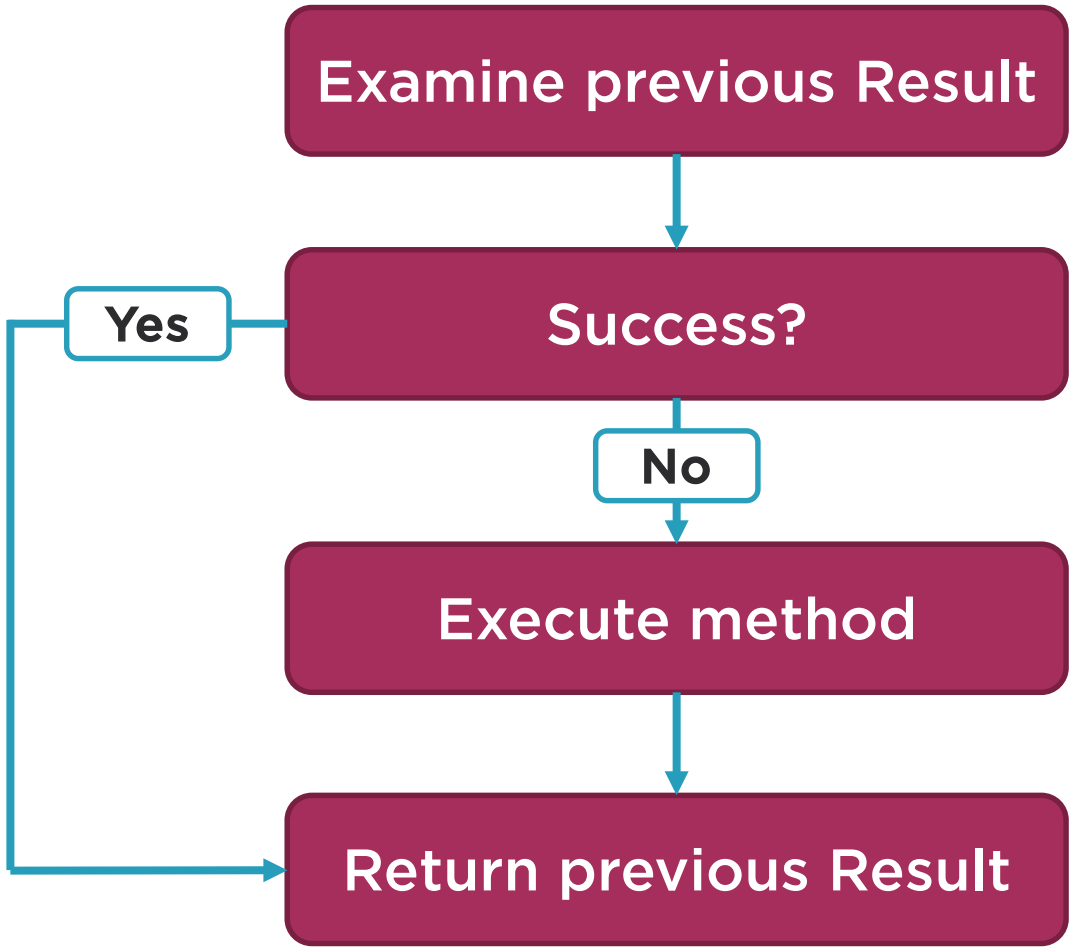
OnFailure

OnBoth

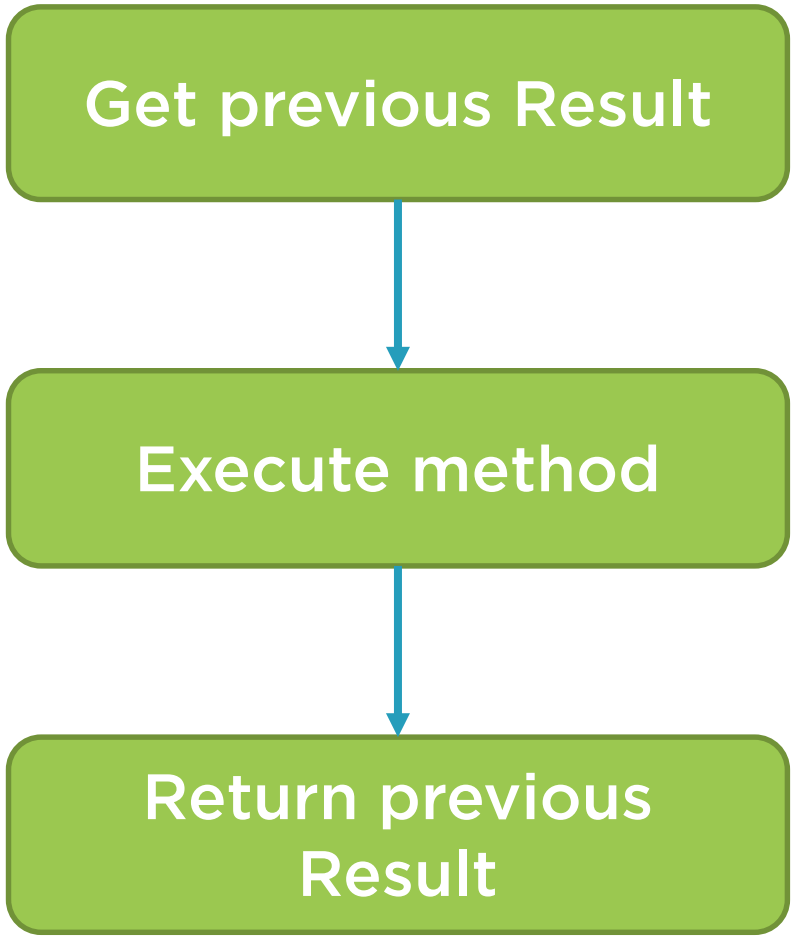
OnSuccess Extension Method



OnFailure Extension Method



OnBoth Extension Method



Recap: Introducing Railway-oriented Programming

```
public string RefillBalance(int customerId, decimal moneyAmount)
{
    Result<MoneyToCharge> moneyToCharge = MoneyToCharge.Create(moneyAmount);
    Result<Customer> customer = _database.GetById(customerId).ToResult("Customer is not found");

    return Result.Combine(moneyToCharge, customer)
        .OnSuccess(() => customer.Value.AddBalance(moneyToCharge.Value))
        .OnSuccess(() => _paymentGateway.ChargePayment(customer.Value.BillingInfo, moneyToCharge.Value))
        .OnSuccess(
            () => _database.Save(customer.Value)
                .OnFailure(() => _paymentGateway.RollbackLastTransaction()))
        .OnBoth(result => Log(result))
        .OnBoth(result => result.IsSuccess ? "OK" : result.Error);
}
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```

⚠ **Isn’t suitable for sophisticated scenarios**

✓ **Extension methods can be moved to Result**

Summary

Handling failures and input errors in a functional way

Railway-oriented approach

Extension methods

- OnSuccess, OnFailure, OnBoth
- Work on top of Result

In the Next Module

Putting it all together

- Conversion between Maybe and nulls
- Using the Result class
- Employing Value Objects
- Saving the domain model into a database