Pipes and Filters

Exercise Notes

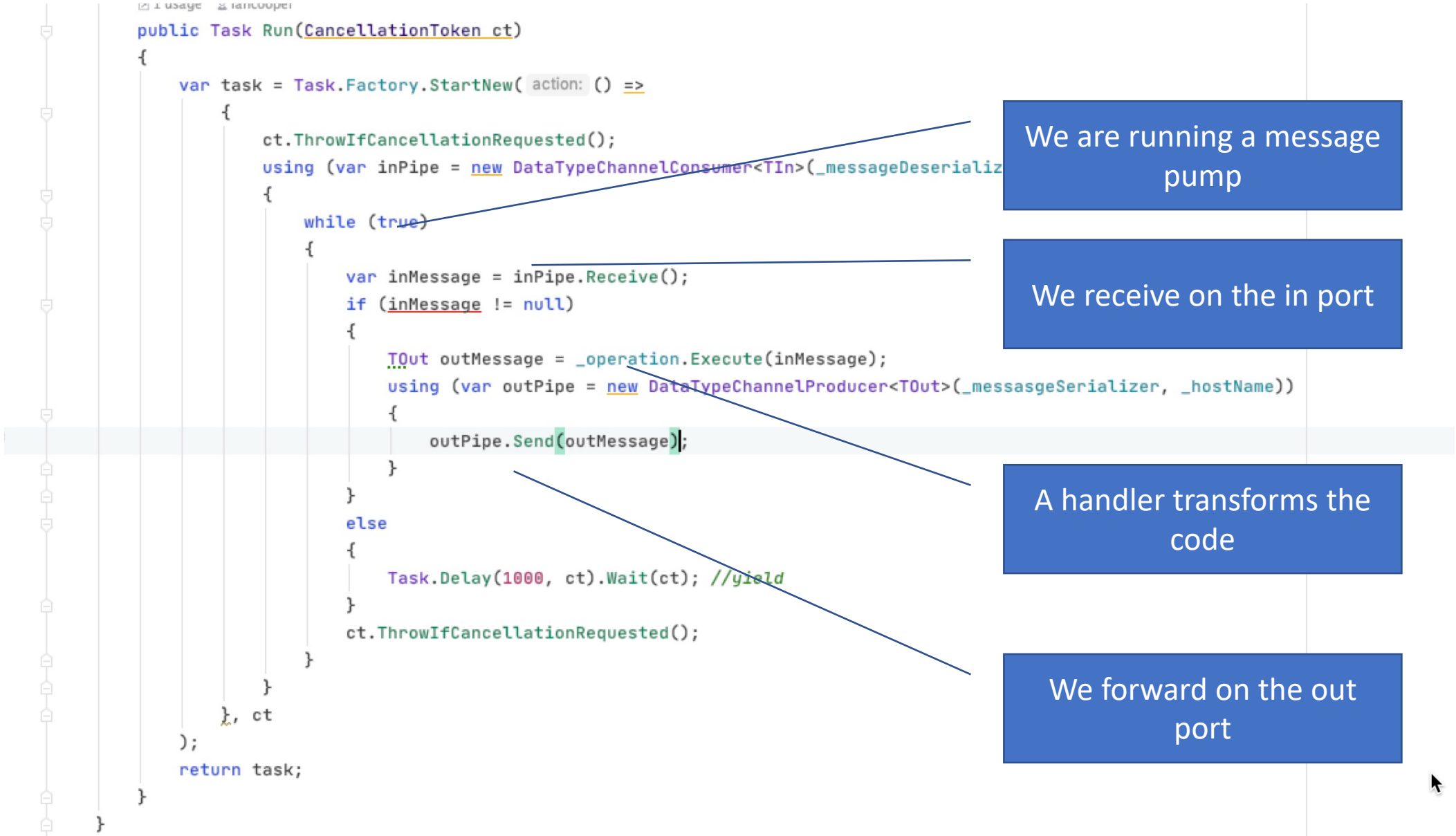
Introduction

- In this exercise you will create a Content Enricher
- Previously we forwarded a message from a Producer to a Consumer
  - The message travelled by an Exchange
  - An RMQ Exchange is a Dynamic Router
    - Or perhaps a direct/default exchange is a Recipient List and a topic exchange is a dynamic router

Notes

- We create an explicit Filter type, but that is actually unnecessary
  - A Handler can take a dependency on a Producer and send in response to actioning a message
  - Often understood as receive Command and raise Event/Document in response
  - Our use here is mainly to highlight the role being played, which is often elided when we think about a Hander raising an event in turn.
- Ask Ian to tell you about Clarissa, when you reach this point
  - We'll explain how it relates to messaging

C#


public Task Run(CancellationToken ct)
{
var task = Task.Factory.StartNew(action: () =>
{
ct.ThrowIfCancellationRequested();
using (var inPipe = new DataTypeChannelConsumer<TIn>(_messageDeserializ
{
while (true)
{
var inMessage = inPipe.Receive();
if (inMessage != null)
{
TOut outMessage = _operation.Execute(inMessage);
using (var outPipe = new DataTypeChannelProducer<TOut>(_messasgeSerializer, _hostName))
{
outPipe.Send(outMessage);
}
}
else
{
Task.Delay(1000, ct).Wait(ct); //yield
}
ct.ThrowIfCancellationRequested();
}
}
}, ct
);
return task;
}
}
We are running a message pump
We receive on the in port
A handler transforms the code
We forward on the out port

Python

```python
def filter(cancellation_queue: Queue, input_class: Type[Request], deserializer_func: Callable[[str], Request],
           output_class: Type[Request], operation_func: Callable[[Request], Request], serializer_func: Callable[[Request], str],
           host_name: str= 'localhost') -> None:
    """
    Intended to be called from a thread, we consumer messages in a loop, with a delay between reads from the queue in order
    to allow the CPU to service other requests, including the supervisor which may want to signal that we should quit
    We use a queue to signal cancellation - the cancellation token is put into the queue and a consumer checks for it
    after every loop
    :param cancellation_queue: Used for inter-process communication, push a cancellation token to this to terminate
    :param input_class: What is the type of message we expect to receive on this channel
    :param deserializer_func: How do we serialize messages from the wire into a python object
    :param host_name: Where is the RMQ exchange
    :return:
    """
    with Consumer(input_class, deserializer_func, host_name) as in_channel:
        while True:
            in_message = in_channel.receive()
            if in_message is not None:
                with Producer(output_class, serializer_func) as out_channel:
                    out_message = operation_func(in_message)
                    out_channel.send(out_message)
                    print("Sent Message: ", json.dumps(vars(out_message)))
            else:
                print("Did not receive message")

            # This will block whilst it waits for a cancellation token; we don't want to wait long
            try:
                token = cancellation_queue.get(block=True, timeout=0.1)
                if token is cancellation_token:
                    print("Stop instruction received")
                    break
            except Empty:
                time.sleep(0.5)  # yield between messages
                continue
```

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JavaScript

```
Filter.prototype.filter = function(channel, inCb, outCb){
    var me = this;
    channel.prefetch(1);
    channel.consume(me.inputQueueName, function(msg){
        try {
            const request = me.deserialize(msg.content);
            const output = inCb(null, request);
            channel.ack(msg);
            channel.publish(exchangeName, me.outputRoutingKey, Buffer.from(me.serialize(output)), {persistent:true}, function(err,ok){
                if (err) {
                    console.error("AMQP", err.message);
                    throw err;
                }
                outCb(output);
            });
        }
        catch(e){
            channel.nack(msg, false, false);
            outCb(e, null);
        }
    }, {noAck:false});
};
```

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Java

```
public void run() {
    try {
        while (!Thread.currentThread().isInterrupted()) {
            try (DataTypeChannelConsumer<TIn> inPipe = new DataTypeChannelConsumer<>(messageDeseria
                TIn inMessage = inPipe.receive();
                if (inMessage != null) {
                    TOut outMessage = operation.execute(inMessage);
                    try (DataTypeChannelProducer<TOut> outPipe = new DataTypeChannelProducer<>(messageSerializer, outRoutingKey, hostName)) {
                        outPipe.send(outMessage);
                    }
                } else {
                    Thread.yield();
                }
            }
        }
    } catch (Exception e) {
        e.printStackTrace();
    }
}
```

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Go

```
func (f *Filter) Run(transform Transform) {  1 usage   Ian Cooper
    producer := NewProducer( qName: "sink-p2p", f.serialize)
    defer producer.Close()

    msgs := make(chan interface{})
    consumer := NewConsumer( qName: "source-p2p", f.deserialize, func(message interface{}) {
        msgs <- message
    })
    defer consumer.Close()

    go func(p *Producer) {
        for msg := range msgs {
            newMsg := transform(msg)
            p.Send(newMsg)
        }
    }(producer)

    consumer.Receive()
}
```

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