Sending scheduled SQL query results via HTML e-mail using SSIS

New Introduction

This article was written in early 2008 and originally published on SQLServerCentral.com. It's been a featured article on the site several times in the meantime and was republished as part of the book "Best of SQLServerCentral Volume 6". I still receive questions about the article every couple of weeks and it drives significant traffic to my web site to this day.

All this attention came as a surprise. It's always difficult to judge which topics are worth covering and submitting to a popular site like SQLServerCentral.com and how to treat them. How much knowledge and experience can one assume from one's readers? You know that some people will be lost if you don't specify exactly, step-by-step, what you need to do and why you do it, but you also know that you'll be criticised mercilessly if you make mistakes or gloss over potential problems by readers who know much more about your chosen topic than you do.

At the time though, articles and documentation on SSIS was relatively sparse, so it seemed like an fruitful avenue to pursue. This turned out to be a good choice; the article provoked a lot of (mostly positive) reactions and was highly rated

All code and examples in this article were created and tested on a SQL Server 2005 environment.

Scenario

Some time ago I was creating an SQL Server Integration Services package to pump data from one SQL system to another. One of the functions of the package was to delete records on the destination system that had changed status on the source system. This delete action was not possible if child records existed in other tables of the destination database, so I went about figuring out if it was possible to automatically notify users that these records had not been deleted via e-mail. They needed to get full details in a user-friendly format so they could take further action, so HTML mail was the desired means of delivery.

The package I came up with to achieve this can be used to mail any suitable SQL result set and proves once again the flexibility of SSIS and the different ways it can be used to solve a variety of problems beyond its everyday use as an ETL tool.

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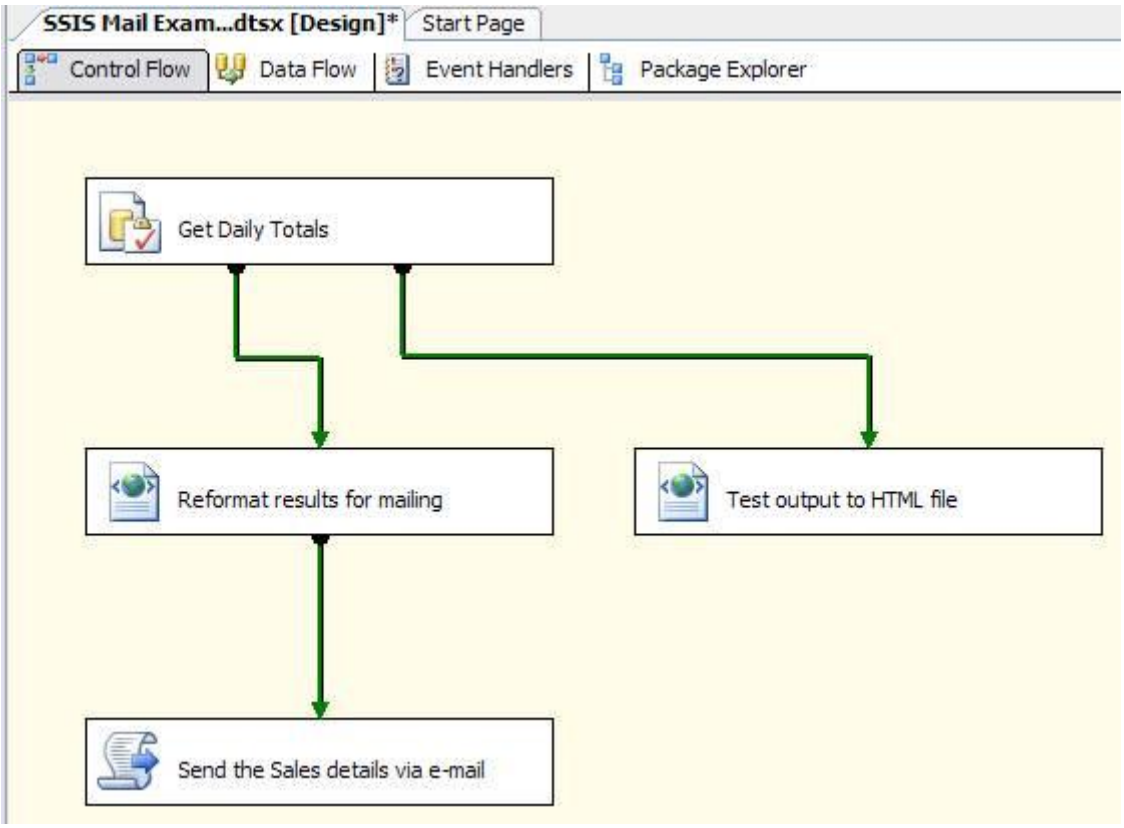
This example queries the SQL 2005 AdventureWorks database and returns sales figures for a given date in a formatted e-mail.

Requirements and working assumptions

You'll need a copy of the SQL 2005 AdventureWorks database running on a test server.

I'm assuming that you're familiar with using the SQL BI Dev Studio tools and building basic packages. If this isn't the case, I recommend working your way through the Integration Services Tutorial in SQL Books Online to become familiar with the basic concepts.

This package makes use of a basic XSL transformation to massage the SQL XML query results and transform them into a user-friendly HTML format. I'm not going to go into any detail regarding XSL, but some useful links are listed at the end of the article if you're curious to learn more.



Steps

1. Open Visual Studio/SQL BI Development Studio and create a new SSIS package named "SSIS Mail Example".

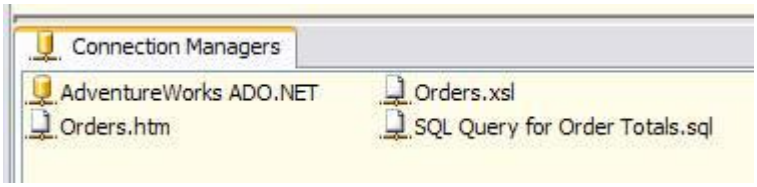
2. Create a folder on your hard drive for the files we'll be using in this example, for instance: C:\SSIS_Example.

3. Download the SQL file (see links at the end of this document) and save it in this folder. Create a new file connection to it (right-click in the Connection Managers pane, select "New File Connection", select "Existing File" from the drop-down and browse to the SQL file) and name it "SQL Query for Order Totals.sql".

4. Download the XSL file (see links) and save it in the same folder. Create a new file connection to it and name this connection "Orders.xsl"

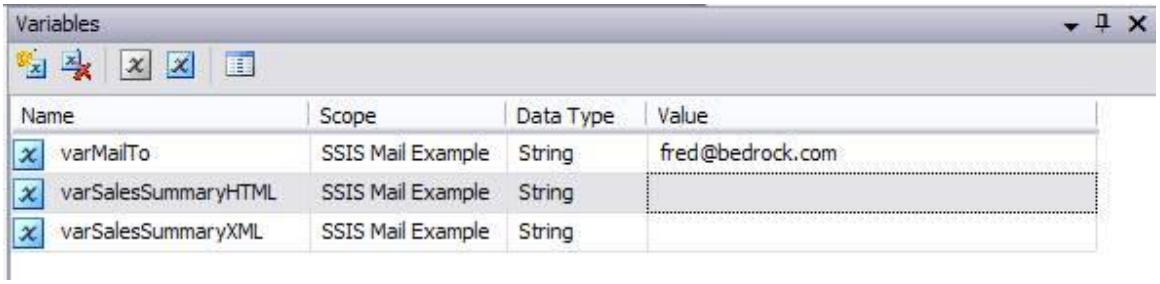
5. Create a new empty file named "Orders.htm" in the same folder. Create a new file connection to it named "Orders.htm".

6. Create an ADO.NET connection to your AdventureWorks database and name it "AdventureWorks ADO.NET". By now you should have four new connection manager objects in your package:



7. Create three package-scoped variables as follows:

Name	Data Type	Value
varSalesSummaryXML	String	
varSalesSummaryHTML	String	
varMailTo	String	(Your e-mail address)



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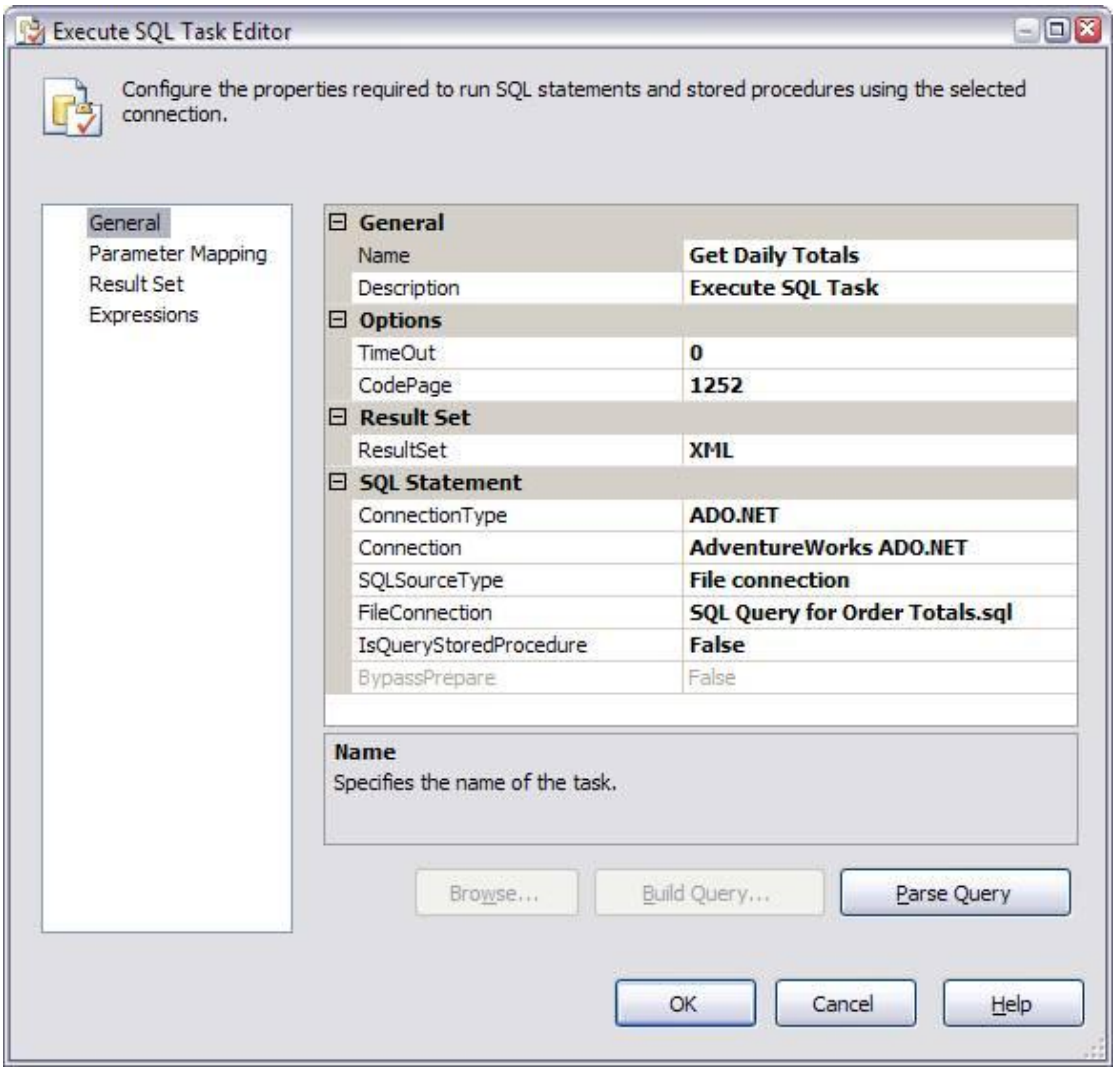
8. Add an Execute SQL Task named “Get Daily Totals” to the Control Flow pane. Set the Properties in the General tab as follows:

ResultSet:	XML
Connection Type:	ADO.NET
Connection:	AdventureWorks ADO.NET
SQLSourceType:	File connection
FileConnection:	SQL Query for Order Totals.sql
IsQueryStoredProcedure	False




```
declare       @v_CurrentDate      datetime
set           @v_CurrentDate =    '2003-07-17'

if      exists (select 1
                from   Sales.SalesOrderHeader
                where  OrderDate =   @v_CurrentDate)

begin

        select top 10 oh.OrderDate,
                      (select       round(sum(TotalDue), 2)
```

```
                    from   Sales.SalesOrderHeader
                    where  OrderDate =  @v_CurrentDate) as DayTotal,
                    p.ProductID, p.Name,
                    round(sum(oh.TotalDue), 2) as ProductSubtotal
        from   Sales.SalesOrderHeader     oh
        join   Sales.SalesOrderDetail     od
        on     od.SalesOrderID =          oh.SalesOrderID
        join   Production.Product         p
        on     p.ProductID =              od.ProductID
        where  oh.OrderDate =             @v_CurrentDate

        group
        by     oh.OrderDate, p.ProductID, p.Name

        order
        by     5 desc, p.ProductID asc

        for xml auto, elements, type, root('Order')

end

else   select cast('<NoRecords>No sales records available for this
date.</NoRecords>' as xml)
```


The SQL query in this example uses a hard-coded date so that we get useful results from the AdventureWorks database. In a production scenario where daily or weekly results are needed on live data you'd probably use some variation of GETDATE() and/or DATEDIFF to filter the records.

The query uses an IF block to cater for the possibility that no records exist on a given date, so the query will always return an XML result set.

```
<Order>
  <oh>
    <OrderDate>2003-07-17T00:00:00</OrderDate>
    <DayTotal>32411.9300</DayTotal>
    <p>
      <ProductID>878</ProductID>
      <Name>Fender Set - Mountain</Name>
      <ProductSubtotal>7890.1200</ProductSubtotal>
    </p>
    <p>
      <ProductID>779</ProductID>
      <Name>Mountain-200 Silver, 38</Name>
      <ProductSubtotal>7882.9600</ProductSubtotal>
    </p>

       ...

    <p>
      <ProductID>795</ProductID>
      <Name>Road-250 Black, 52</Name>
      <ProductSubtotal>2708.6900</ProductSubtotal>
    </p>
  </oh>
</Order>
```

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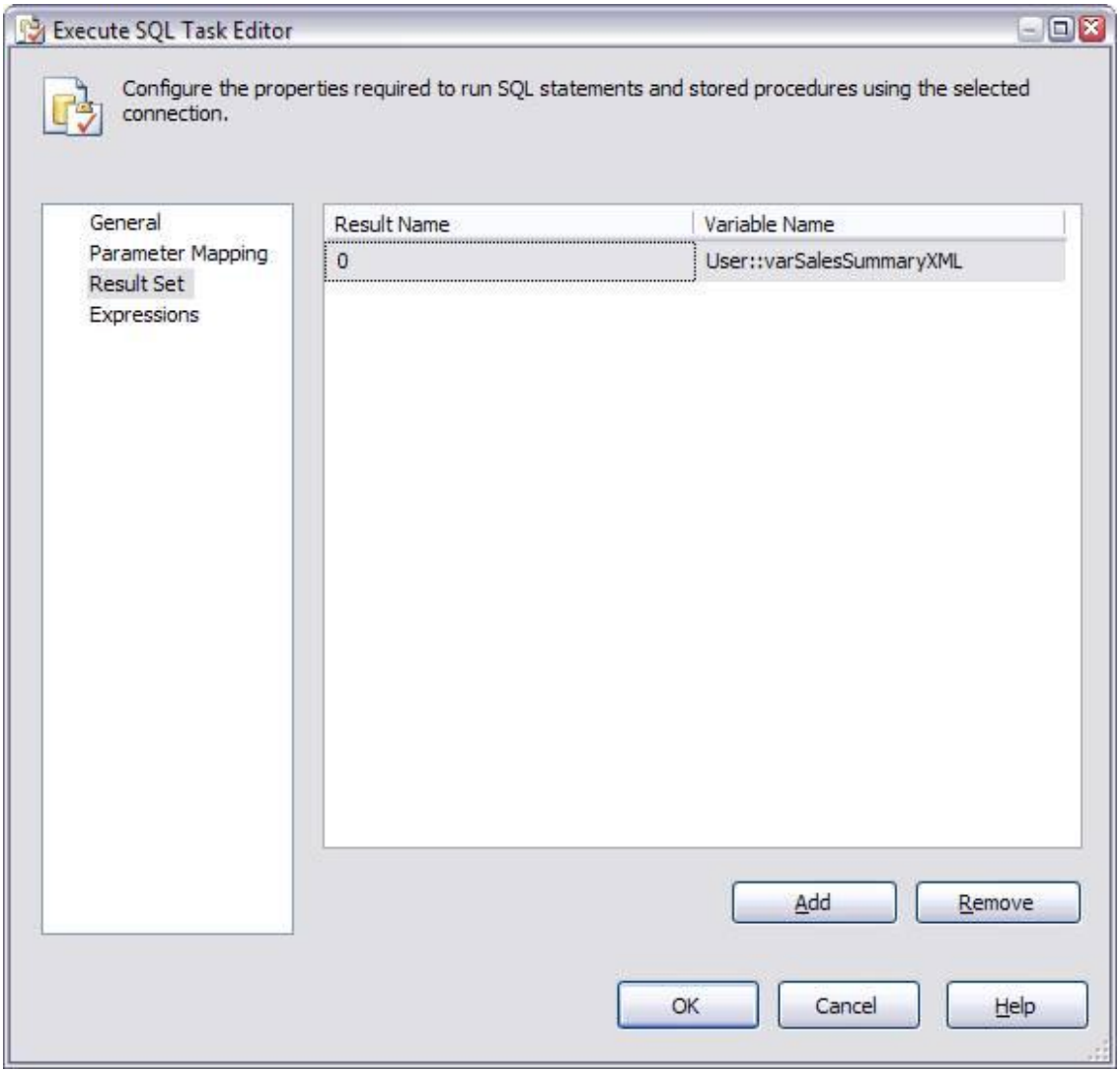
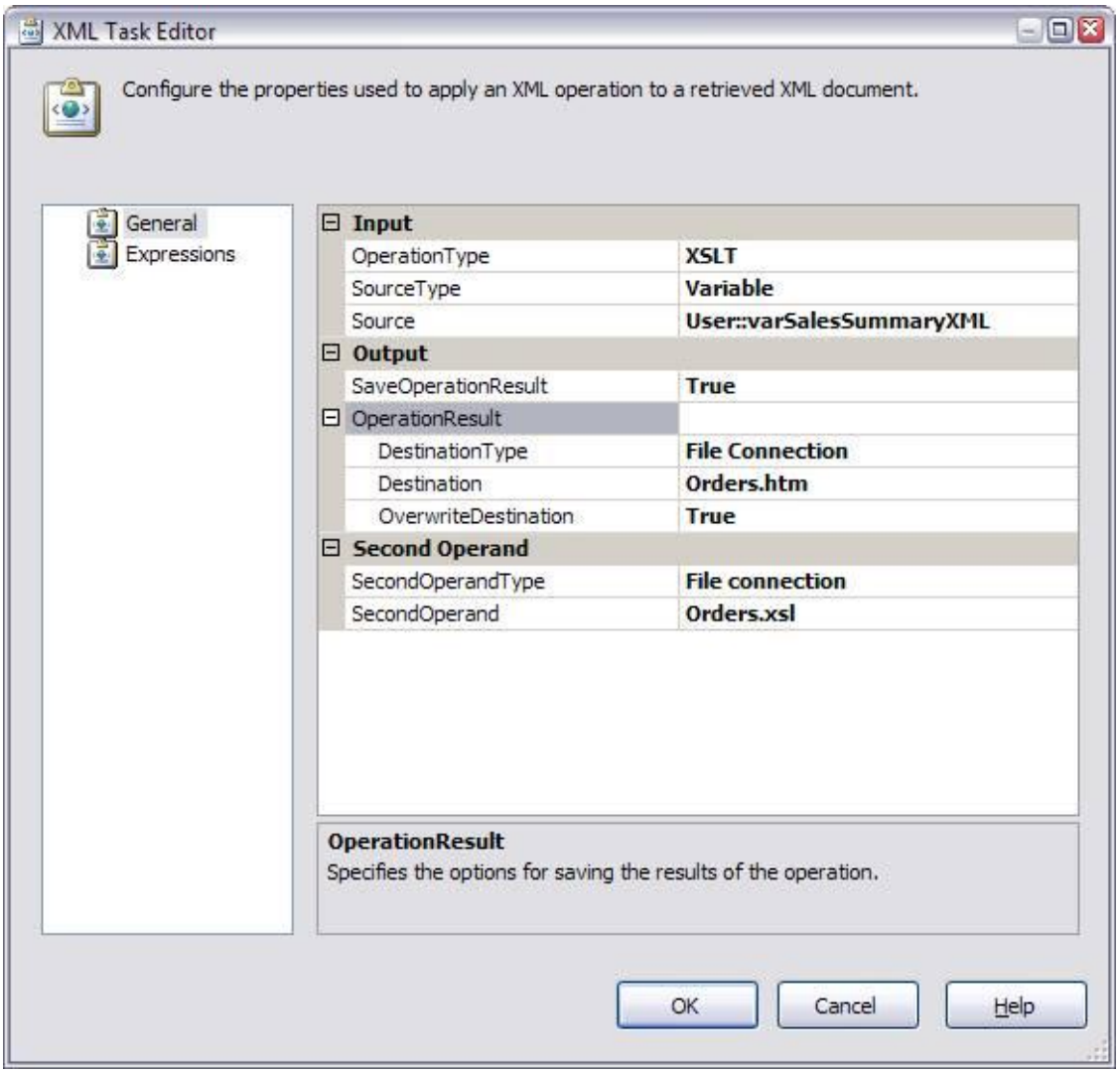
9. On the Result Set tab, click ‘Add’ and select the varSalesSummaryXML variable from the list. Add 0 (number zero) as the Result Name.



10. Add an XML Task to the Control Flow pane and name it “Test output to HTML file”. Drag the green precedence constraint pointer to it from the “Get Daily Totals” task and set the Properties in the General tab as follows:

OperationType:	XSLT
SourceType:	Variable
Source:	User::varSalesSummaryXML
SaveOperationResult:	True
DestinationType:	File Connection
Destination:	Orders.htm
OverwriteDestination:	True
SecondOperandType:	File connection

SecondOperand: Orders.xsl



This task will take the XML output from the “Get Daily Totals” task and transform it into HTML using the template in the XSL file. We’ll use it to verify that the query and the transformation are generating a valid local HTML file with the desired results. Once we’ve completed the package and our result set is being successfully mailed then we can remove this task, but for now it’s handy for troubleshooting.

You should now be able to give the package a test run. Execute the package and once it has completed open the Orders.htm file you created earlier in your web browser.

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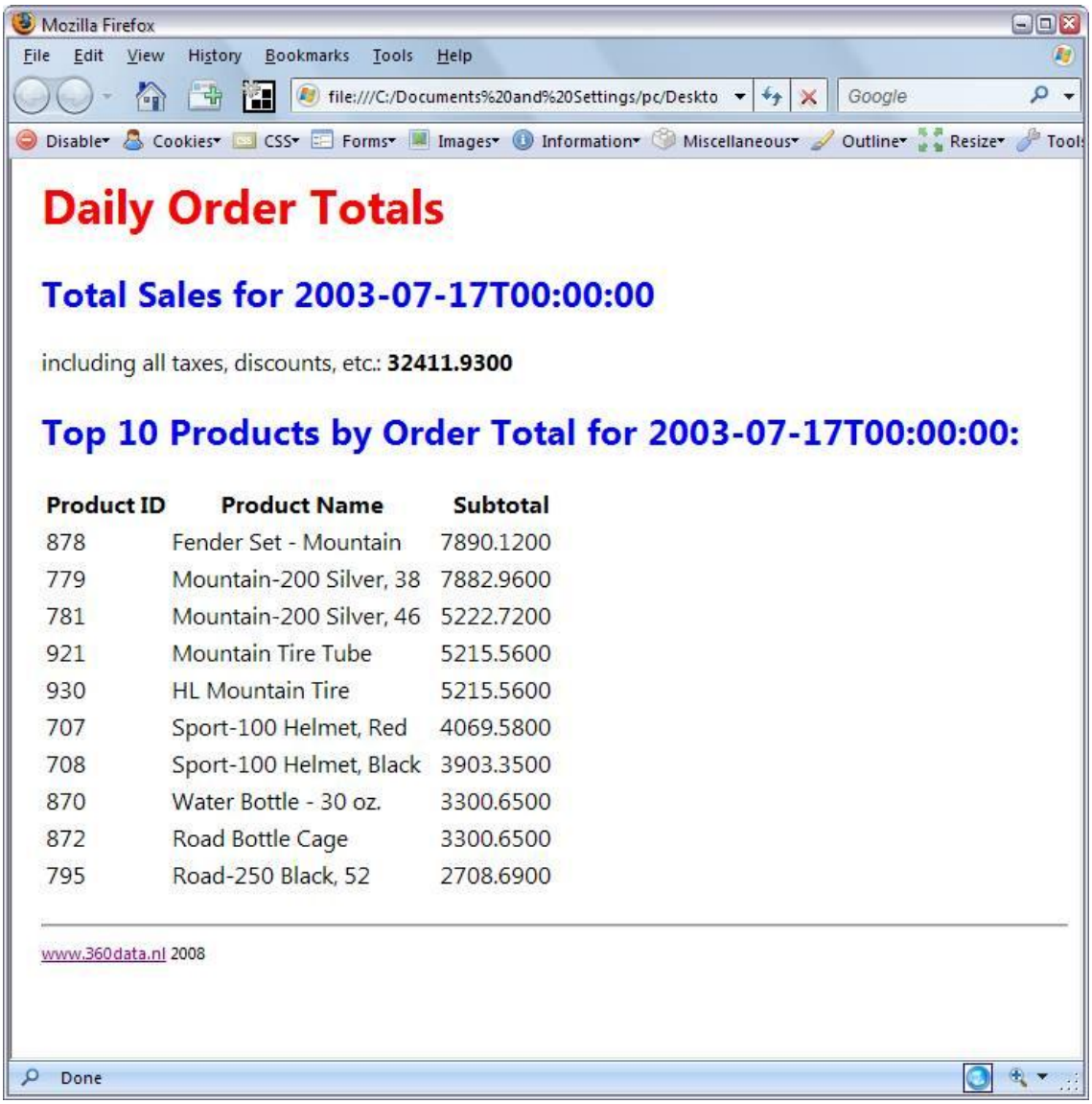
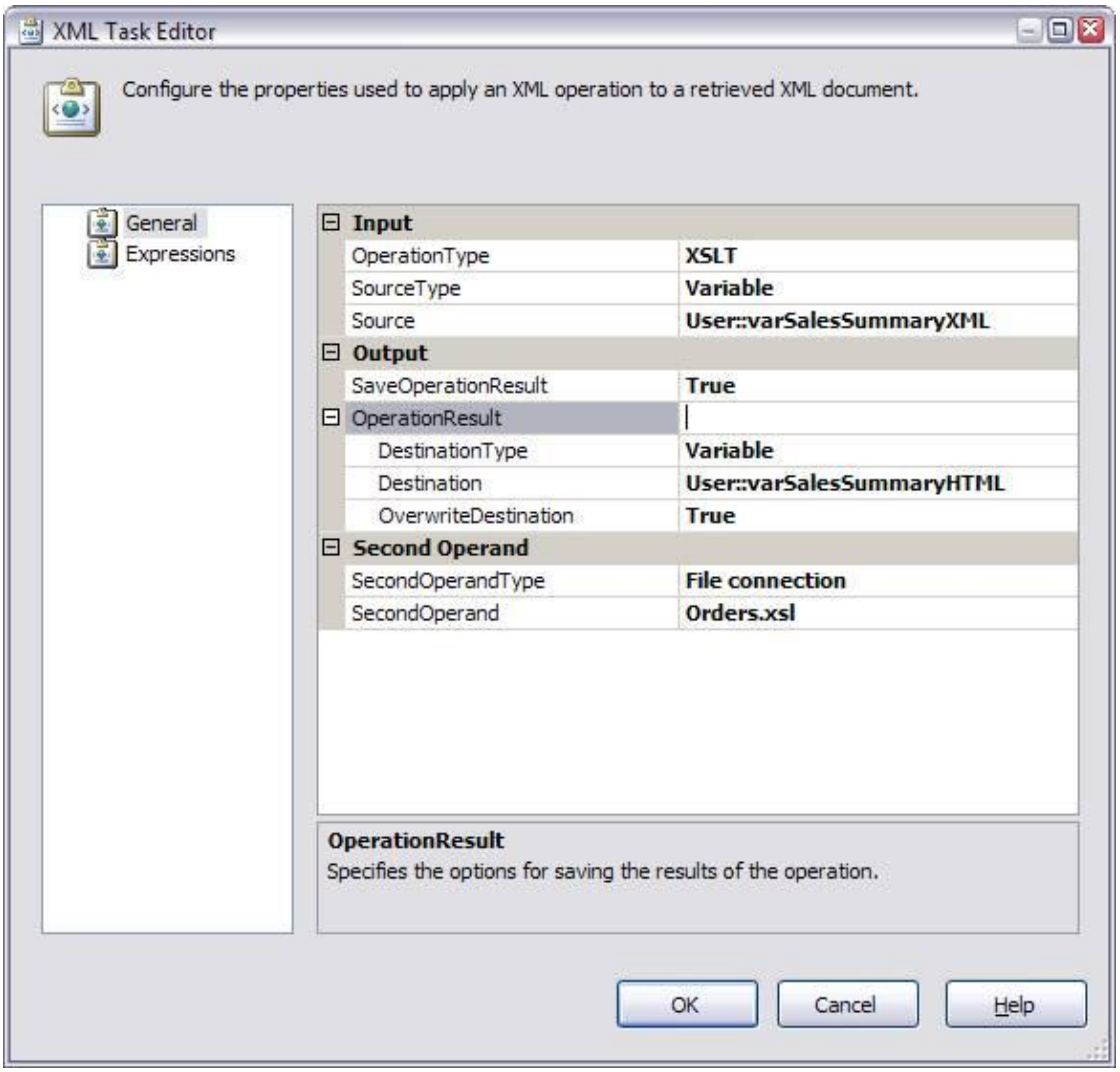


Once you've confirmed that this is working correctly we can proceed with getting the result set ready for mailing.

11. Add an XML Task to the Control Flow pane and name it "Reformat results for mailing". Right-click on the "Get Daily Totals" task and select "Add Precedence Constraint", then drag the new constraint pointer to the newly created XML task.

12. Set the Properties for “Reformat results for mailing” in the General tab as follows:

OperationType:	XSLT
SourceType:	Variable
Source:	User::varSalesSummaryXML
SaveOperationResult:	True
DestinationType:	Variable
Destination:	User::varSalesSummaryHTML
OverwriteDestination:	True
SecondOperandType:	File connection
SecondOperand:	Orders.xsl



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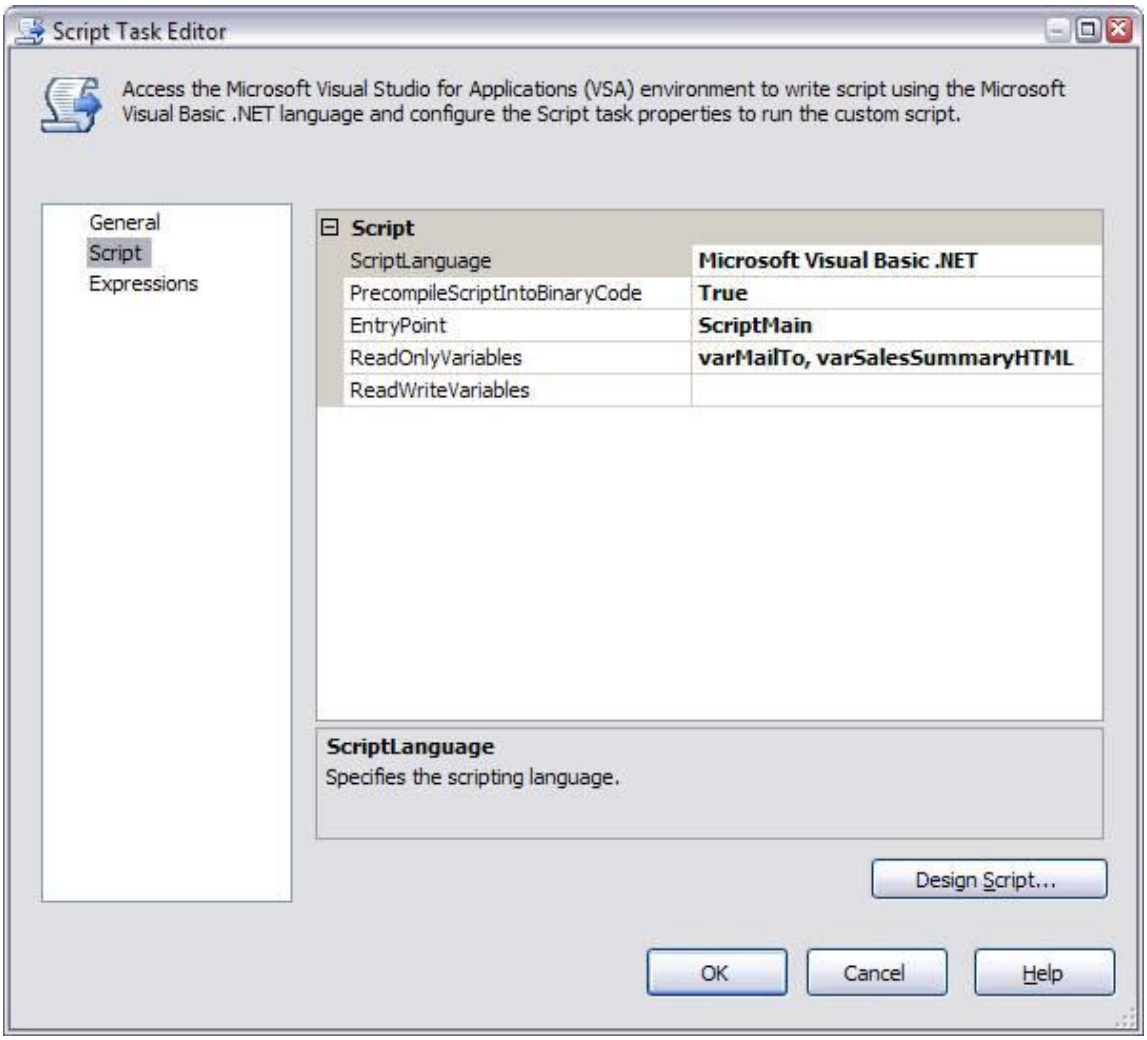
13. Add a new Script Task to the Control Pane and drag the green precedence constraint pointer to it from the “Reformat results for mailing” task. Rename the script task to “Send the Sales details via e-mail”.

    We’ll use a Script Task instead of a Send Mail task because the latter doesn’t support HTML-formatted mail.

14. On the Script tab of the Script Task Editor, enter varMailTo, varSalesSummaryHTML in the ReadOnlyVariables field.



15. Click “Design Script” to open the SSIS VSA editor. Replace the default (basis) code in the editor with the code listed below:

```
Option Strict Off

Imports System
Imports System.Data
Imports System.Math
Imports System.Net.Mail
Imports Microsoft.SqlServer.Dts.Runtime

Public Class ScriptMain

    Public Sub Main()


        Dim varHTMLMail As MailMessage
        Dim varSMTPClient As SmtpClient
        Dim varMailBody As Object
        Dim varAddresses As String

        varMailBody = Dts.Variables("varSalesSummaryHTML").Value
        varAddresses = Dts.Variables("varMailTo").Value.ToString


       varHTMLMail = New MailMessage("noreply@domain.com", varAddresses,
       "Daily Order Summary", varMailBody)

        varHTMLMail.IsBodyHtml = True

        varSMTPClient = New SmtpClient("Your_SMTP_Server_Name")
        varSMTPClient.UseDefaultCredentials = True

        varSMTPClient.Send(varHTMLMail)


        Dts.TaskResult = Dts.Results.Success

    End Sub

End Class
```

Note the extra namespace reference to System.Net.Mail which we need in order to access the mail methods.

16. Save the script, then Close and Return to your Control Flow surface. The package is now complete and can now be executed.

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Troubleshooting e-mail from SSIS

If the package runs successfully, you're finished. If it fails on the last step though you'll want to check a few things. There's no room in this article to go into the intricacies of configuring SQL to send mail, but you can at least work through the following checklist:

- Is the local HTML file (Orders.htm) output correctly? If not, you'll want to go back a step or two and make sure that you're generating valid HTML first.

- Is your SMTP server address correct?

- Can you send Database Mail from the Management Studio (Management / Database Mail / Send Test E-Mail)? This is not a dependency for mailing from SSIS, but if it works then the package mailing problem is probably not caused by your SMTP server.

- Does your firewall/virus protection software allow mails to be sent from the SQL executables? Try adding DEVENV.EXE, DTSDEBUGHOST.EXE, and SQLWB.EXE to the exclusion lists of your network security software and see if this helps.

- Does your mail server block mail forwarding from unknown sources/servers?

In other words, there are a number of factors outside SSIS that can prevent you from sending mail successfully, but I'm afraid that you'll need to liaise with your network/mail administrator to solve these!

That said, this is still a simple and powerful means of mailing live data to your users. You could take it further and build your Mailing list from another SQL query, or combine multiple result sets in one mail. Deploy the package on your SSIS server, schedule it as desired and you're done.

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References

- The files referred to in the text – SQL Query for Order Totals.sql and Orders.xsl – can be downloaded from this address: http://www.360data.nl/docs/default.aspx

- I adapted Jamie Thomson's SMTP mail script for the Script Task in this example; the original is here: http://blogs.conchango.com/jamiethomson/archive/2006/07/03/SSIS_3A00_-Sending-SMTP-mail-from-the-Script-Task.aspx

- The AdventureWorks db for SQL Server 2005 is available for download at http://www.codeplex.com/MSFTDBProdSamples/

- XSL is pretty easy to grasp if you have any experience with HTML. The example provided in this article is extremely simplistic but illustrates the point well enough. For more information I suggest having a read through these sites:
  http://www.xmlfiles.com/xsl/
  http://zvon.org/xxl/XSLTutorial/Output/index.html

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