Life Cycle of a Purchase Order: EDI X12, XML and PDF

Most of the business transactions B to C (Business to Consumer) today are done by credit card over the web. On the B to B (Business to Business) the volume and the velocity require a different approach, where computer systems do most of the work. These systems are called supply chain networks and their job is to connect buyers and sellers electronically to exchange goods of any kind.

Supply chain networks have existed for many years but were difficult and costly to integrate, which restricted their market to the elite. Their inability to accept medium and small businesses forced a large portion of the supply chain networks out of business.

The survivors learned the lesson and started to offer a scaled down version of their services, increasing the size of their customer base. The larger the network, the greater the chance of success, especially in growing markets such as China and India.

Computer hardware evolves at a fast pace, as Moore's law states: every two years CPU makers double the number of transistors in a silicon die, improving the lithography process. While IT organizations tend to upgrade their servers every 3 years, data architects are slow to move from time tested successful standards. These standards provide the back bone of systems' interoperability.

One of greatest examples of successful standards for data interchange format is Electronic Data Interchange (EDI), created by the National Institute of Standards and Technology (NIST) in 1996. EDI's goals were simple: a text based format with a well-defined structure, which allows two entities to exchange information.
The beginning of the formal definition reads: <<"the computer-to-computer interchange of strictly formatted messages that represent documents other than monetary instruments.">>.

EDI was an instant hit. A variety of standard bodies specialized in industry verticals creating their own dialects. Here are a few examples:

- Accredited Standards Committee **X12**
- United Nations/Electronic Data Interchange For Administration, Commerce and Transport (UN/**EDIFACT**)
- Health Insurance Portability and Accountability Act of 1996 (**HIPAA**).

EDI is the legacy format that supply chain systems still use today. Industry specific EDI dialects perform millions of transactions per day. EDI standards boards have also come out with an XML version of the dialects but the legacy format is still the de-facto standard.

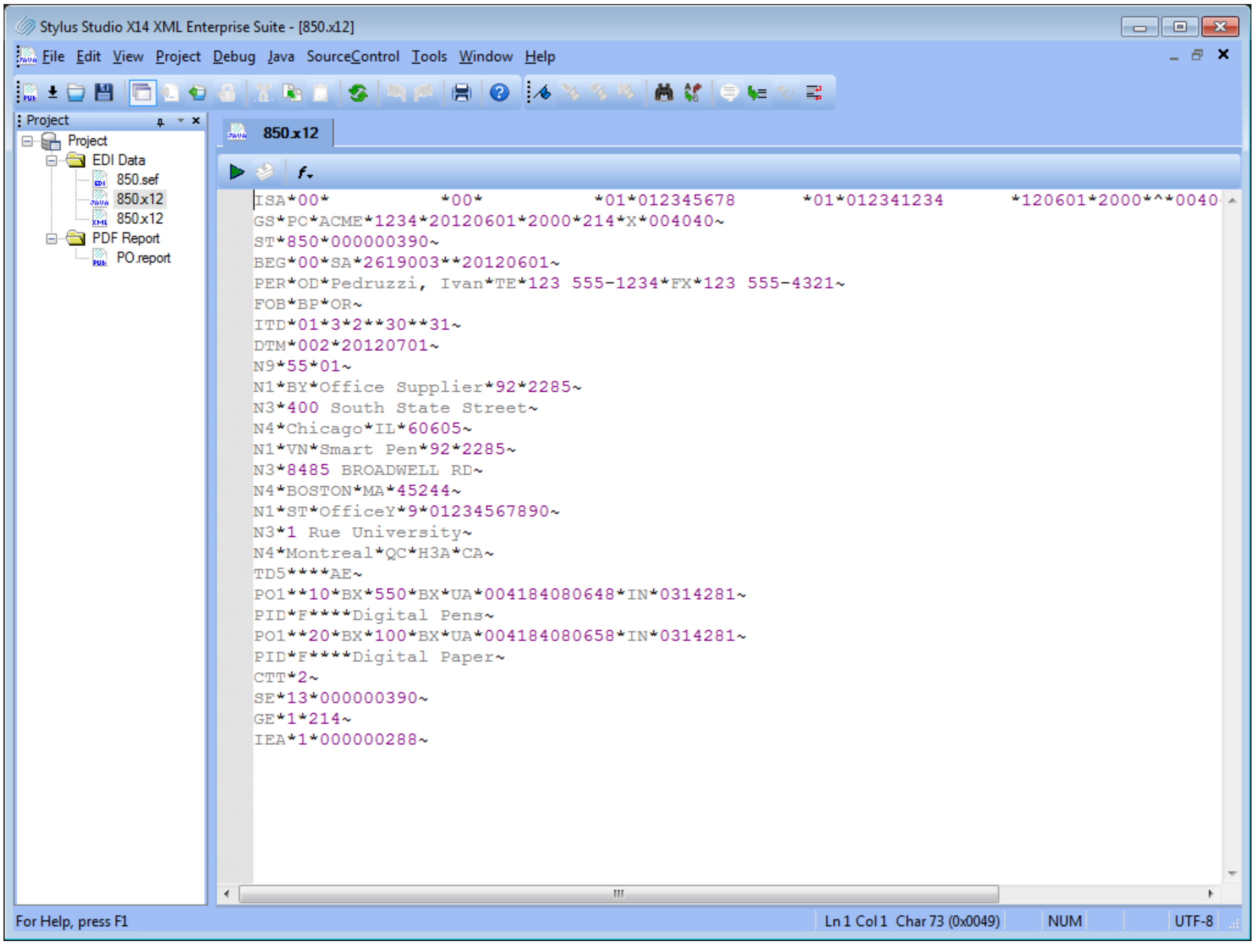
Now in order to participate in these markets, you have to understand how to interpret EDI transactions, and how to respond to a partner. Walmart uses EDI to allow it to scale its business, requiring all suppliers to interact with them using EDI to send documents such as Purchase Orders and Invoices. http://www.walmartstores.com/Suppliers/248.aspx

Before we start, let's refresh our memory on the definition of a Purchase Order.Wikipedia states:

<<"A purchase order (PO) is a commercial document issued by a buyer to a seller, indicating types, quantities, and agreed prices for products or services the seller will provide to the buyer.">>

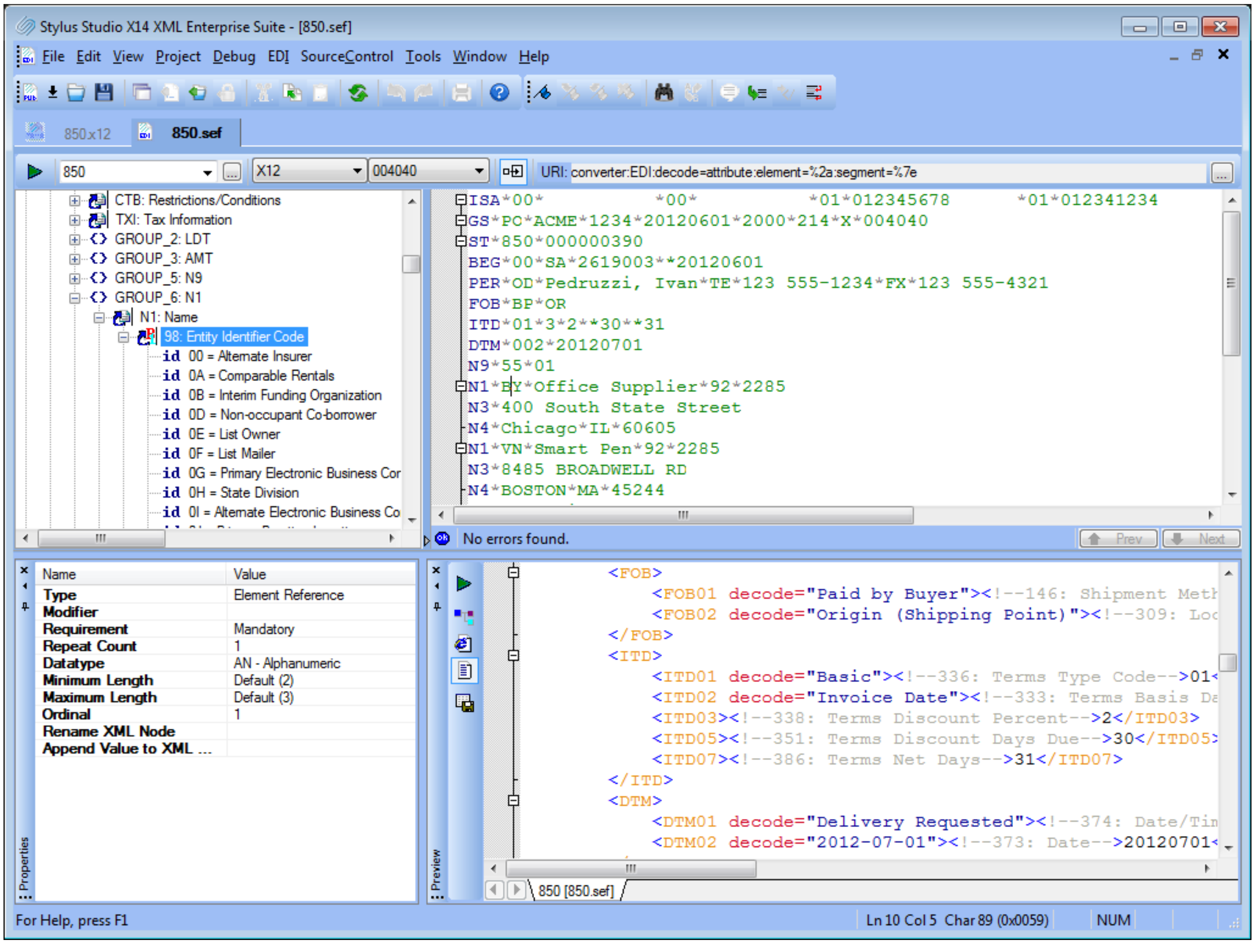
In the following image we see a Purchase Order formatted according to EDI X12 850 in its raw form.

Company "Office Supply" wants to purchase digital pens and appropriate paper blocks from company "Smart Pen" and deliver the products to company "OfficeY".



```
ISA*00*          *00*          *01*012345678      *01*012341234      *120601*2000*^*0040
GS*PO*ACME*1234*20120601*2000*214*X*004040~
ST*850*000000390~
BEG*00*SA*2619003**20120601~
PER*OD*Pedruzzi, Ivan*TE*123 555-1234*FX*123 555-4321~
FOB*BP*OR~
ITD*01*3*2**30**31~
DTM*002*20120701~
N9*55*01~
N1*BY*Office Supplier*92*2285~
N3*400 South State Street~
N4*Chicago*IL*60605~
N1*VN*Smart Pen*92*2285~
N3*8485 BROADWELL RD~
N4*BOSTON*MA*45244~
N1*ST*OfficeY*9*01234567890~
N3*1 Rue University~
N4*Montreal*QC*H3A*CA~
TD5****AE~
PO1**10*BX*550*BX*UA*004184080648*IN*0314281~
PID*F****Digital Pens~
PO1**20*BX*100*BX*UA*004184080658*IN*0314281~
PID*F****Digital Paper~
CTT*2~
SE*13*000000390~
GE*1*214~
IEA*1*000000288~
```

Unfortunately, this is not like XML. You may guess that fields are separated by a special character but there is no markup around them, therefore is very difficult to interpret the values. In the following image we see the same EDI transaction in the Stylus Studio EDI to XML Module http://www.stylusstudio.com/edi/edi_to_xml.html. This is a very useful tool for analyzing EDI documents. We can click anywhere and Stylus Studio shows us which field are we on, thanks to its vast EDI repository. When we right click on a value that represents a code, we can see the description.


Stylus Studio X14 XML Enterprise Suite - [850.sef]
File Edit View Project Debug EDI SourceControl Tools Window Help
850x12
850.sef
850
X12
004040
Prev
Next
Properties
Preview
850 [850.sef]
For Help, press F1
Ln 10 Col 5 Char 89 (0x0059)
NUM

URI: converter:EDI:decode=attribute:element=%2a:segment=%7e

```
CTB: Restrictions/Conditions
TXI: Tax Information
GROUP_2: LDT
GROUP_3: AMT
GROUP_5: N9
GROUP_6: N1
  N1: Name
    98: Entity Identifier Code
      id 00 = Alternate Insurer
      id 0A = Comparable Rentals
      id 0B = Interim Funding Organization
      id 0D = Non-occupant Co-borrower
      id 0E = List Owner
      id 0F = List Mailer
      id 0G = Primary Electronic Business Cor
      id 0H = State Division
      id 0I = Alternate Electronic Business Co
```

```
ISA*00*          *00*          *01*012345678      *01*012341234
GS*PO*ACME*1234*20120601*2000*214*X*004040
ST*850*000000390
BEG*00*SA*2619003**20120601
PER*OD*Pedruzzi, Ivan*TE*123 555-1234*FX*123 555-4321
FOB*BP*OR
ITD*01*3*2**30**31
DTM*002*20120701
N9*55*01
N1*BY*Office Supplier*92*2285
N3*400 South State Street
N4*Chicago*IL*60605
N1*VN*Smart Pen*92*2285
N3*8485 BROADWELL RD
N4*BOSTON*MA*45244
```

No errors found.

Name	Value
Type	Element Reference
Modifier	
Requirement	Mandatory
Repeat Count	1
Datatype	AN - Alphanumeric
Minimum Length	Default (2)
Maximum Length	Default (3)
Ordinal	1
Rename XML Node	
Append Value to XML ...	

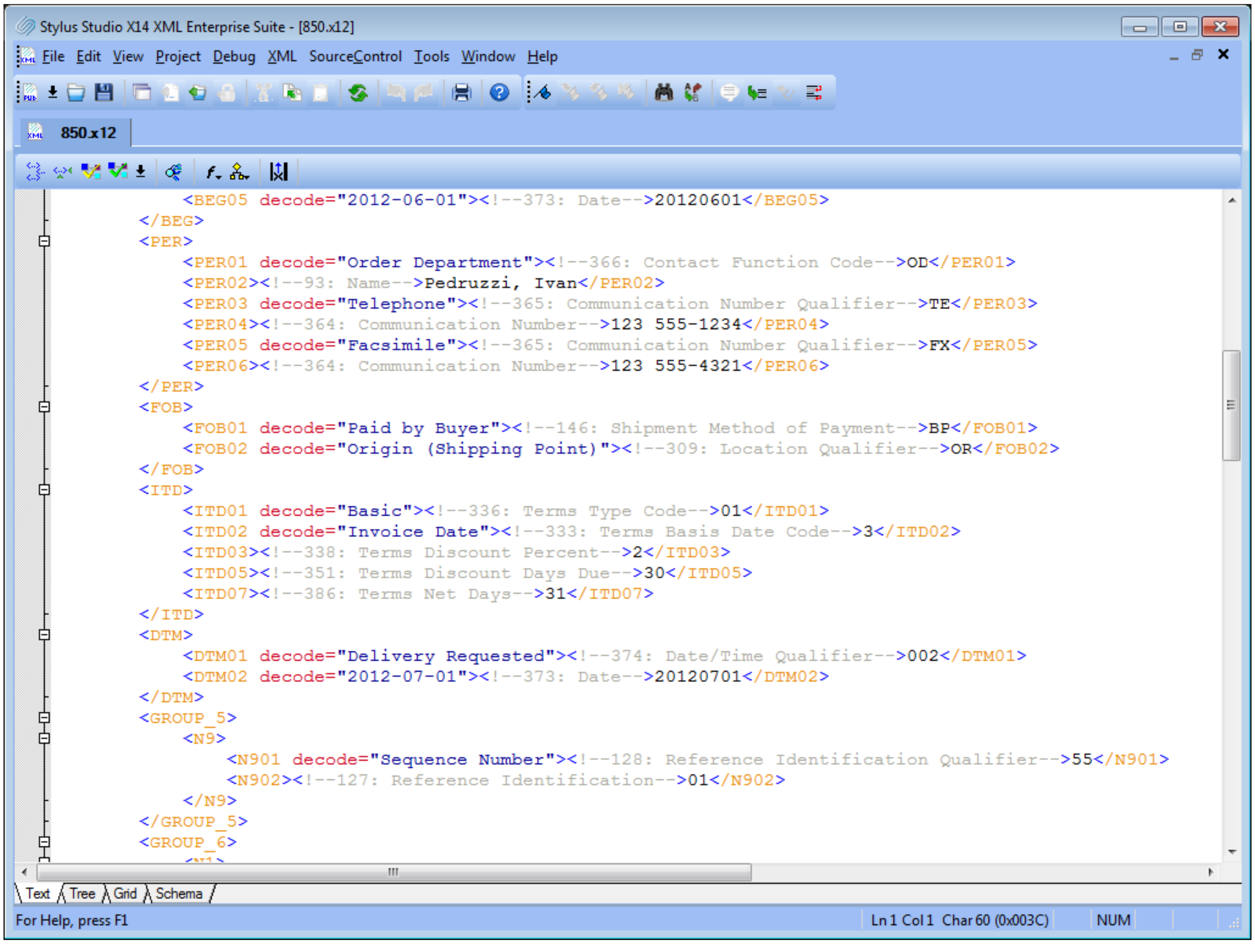
```
<FOB>
    <FOB01 decode="Paid by Buyer"><!--146: Shipment Meth
    <FOB02 decode="Origin (Shipping Point)"><!--309: Loc
</FOB>
<ITD>
    <ITD01 decode="Basic"><!--336: Terms Type Code-->01<
    <ITD02 decode="Invoice Date"><!--333: Terms Basis Da
    <ITD03><!--338: Terms Discount Percent-->2</ITD03>
    <ITD05><!--351: Terms Discount Days Due-->30</ITD05>
    <ITD07><!--386: Terms Net Days-->31</ITD07>
</ITD>
<DTM>
    <DTM01 decode="Delivery Requested"><!--374: Date/Tin
    <DTM02 decode="2012-07-01"><!--373: Date-->20120701<
```

Now that the purchase order is in XML we can take advantage of several technologies to manipulate and to store the data.

The EDI to XML module can be used to validate both the structure, the code list values and in case of errors, provide suggestions to work around the problem. For example, it's quite common to encounter a transaction in which some mandatory fields are missing or the field type does not match the specification. In these situations Stylus Studio flags the error and allows the user to overwrite the field definition to accommodate such customizations.

In Stylus Studio, almost any format can be represented as XML. In the screenshot below the XML Editor is used to edit our purchase order.

The XML representation can be customized with a variety of parameters. You may decide to generate a very verbose form with long element names. You may also use informative comments that provide a detailed description for each field. When looking at Code values in the raw form, they are usually very cryptic terms made of a few characters, which can now be associated with detailed descriptions. The example below shows you that the code value BP stands for "Paid by Buyer".

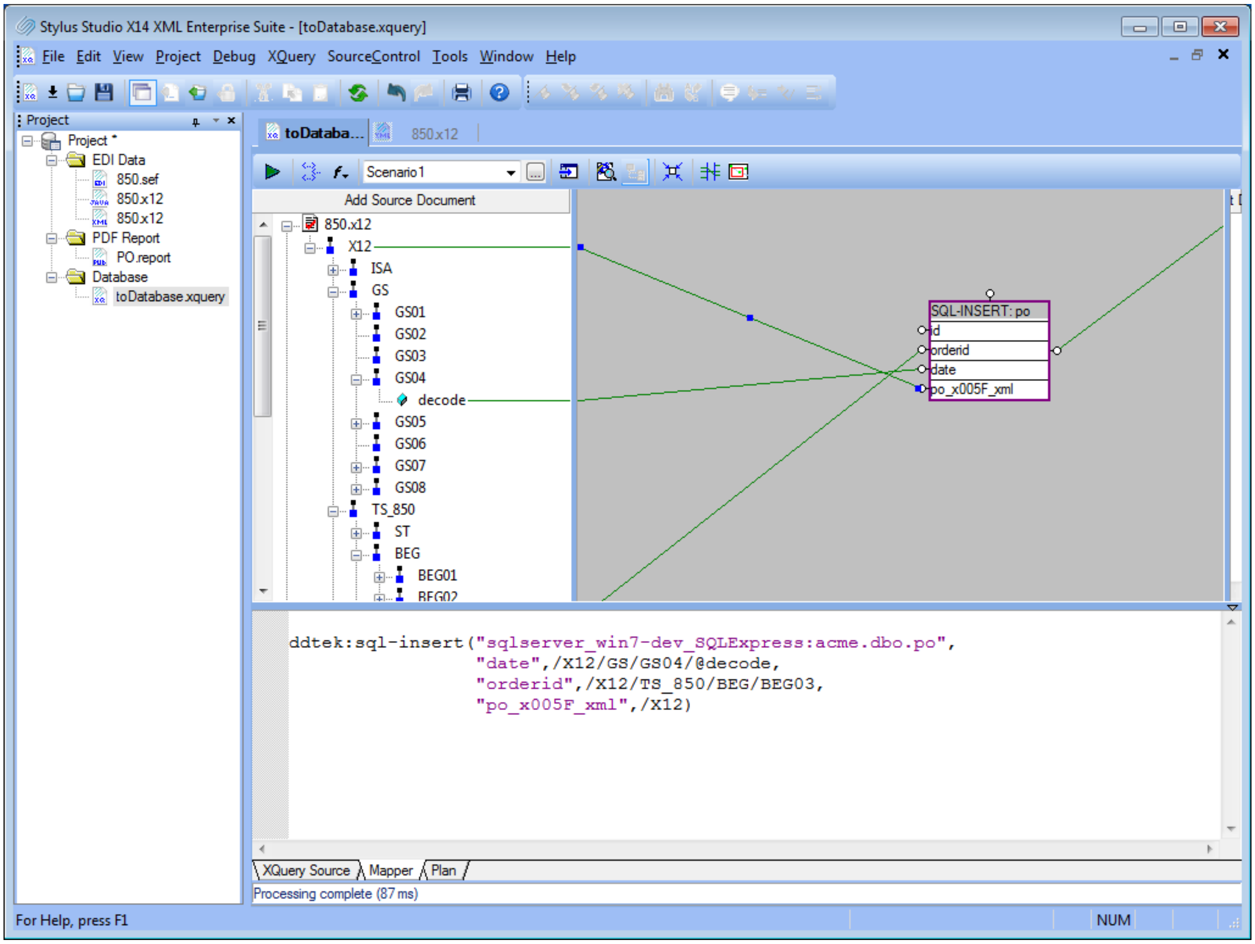


Stylus Studio X14 XML Enterprise Suite - [850.x12]
File Edit View Project Debug XML SourceControl Tools Window Help
850.x12
Text
Tree
Grid
Schema
For Help, press F1
Ln 1 Col 1 Char 60 (0x003C)
NUM

```
        <BEG05 decode="2012-06-01"><!--373: Date-->20120601</BEG05>
    </BEG>
    <PER>
        <PER01 decode="Order Department"><!--366: Contact Function Code-->OD</PER01>
        <PER02><!--93: Name-->Pedruzzi, Ivan</PER02>
        <PER03 decode="Telephone"><!--365: Communication Number Qualifier-->TE</PER03>
        <PER04><!--364: Communication Number-->123 555-1234</PER04>
        <PER05 decode="Facsimile"><!--365: Communication Number Qualifier-->FX</PER05>
        <PER06><!--364: Communication Number-->123 555-4321</PER06>
    </PER>
    <FOB>
        <FOB01 decode="Paid by Buyer"><!--146: Shipment Method of Payment-->BP</FOB01>
        <FOB02 decode="Origin (Shipping Point)"><!--309: Location Qualifier-->OR</FOB02>
    </FOB>
    <ITD>
        <ITD01 decode="Basic"><!--336: Terms Type Code-->01</ITD01>
        <ITD02 decode="Invoice Date"><!--333: Terms Basis Date Code-->3</ITD02>
        <ITD03><!--338: Terms Discount Percent-->2</ITD03>
        <ITD05><!--351: Terms Discount Days Due-->30</ITD05>
        <ITD07><!--386: Terms Net Days-->31</ITD07>
    </ITD>
    <DTM>
        <DTM01 decode="Delivery Requested"><!--374: Date/Time Qualifier-->002</DTM01>
        <DTM02 decode="2012-07-01"><!--373: Date-->20120701</DTM02>
    </DTM>
    <GROUP_5>
        <N9>
            <N901 decode="Sequence Number"><!--128: Reference Identification Qualifier-->55</N901>
            <N902><!--127: Reference Identification-->01</N902>
        </N9>
    </GROUP_5>
    <GROUP_6>
        <N1>
```

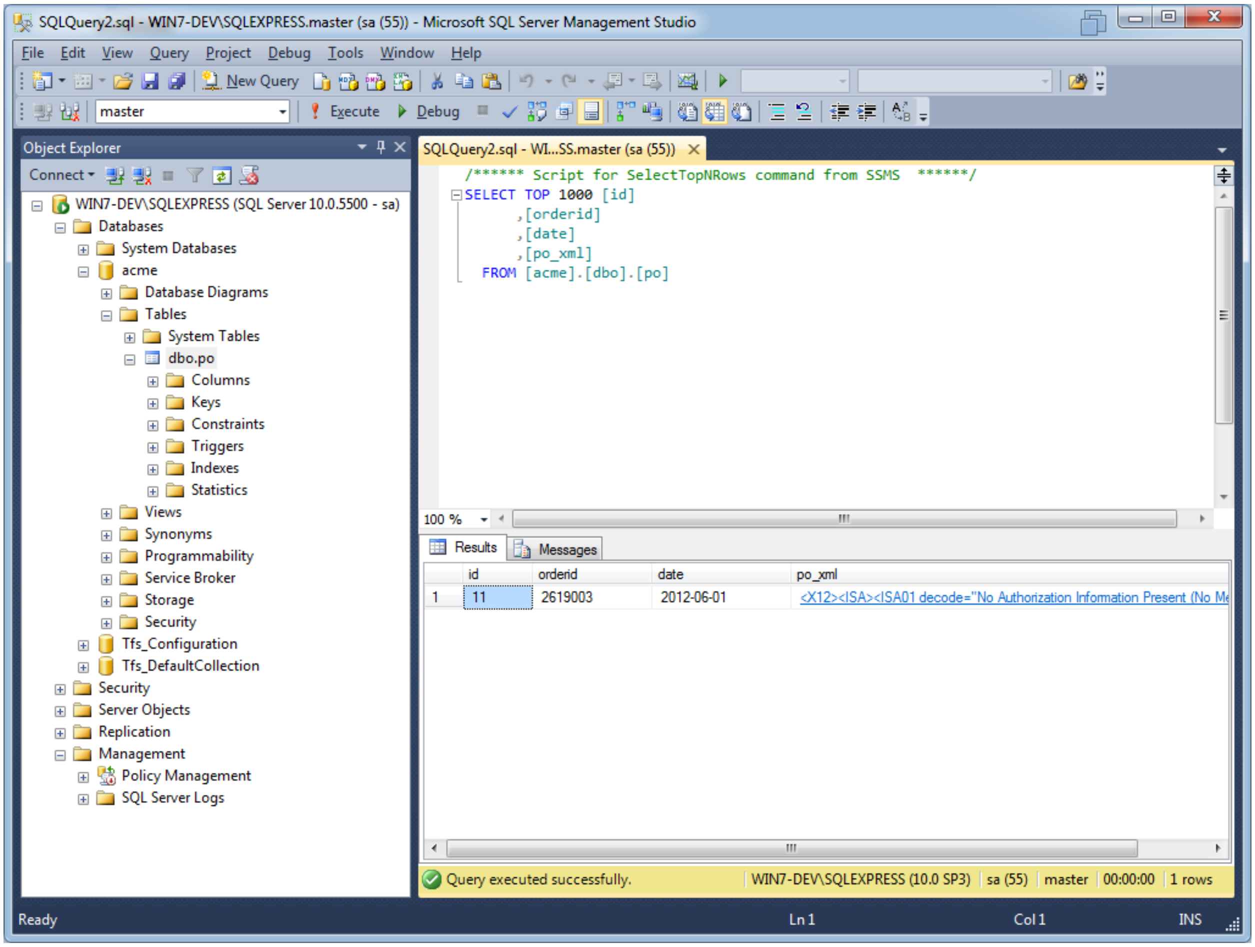
When an EDI transaction comes in, the first thing we want to do is to archive it in a database. Often there are regulations that require electronic copies to be maintained for several years and storing the transaction in a relation database is the most common place where it can be archived. The following screenshot shows how the Stylus Studio XQuery mapping tool can help you to onboard the transaction into a database. In our example we are using Microsoft SQL Server 2008.

We would like to point out a benefit of using the DataDirect XQuery engine, bundled with Stylus Studio. This combination allows you to store primitive types such as the order id and the order date as well as the entire input document into an XML type column.



```
ddtek:sql-insert("sqlserver_win7-dev_SQLExpress:acme.dbo.po",
                 "date",/X12/GS/GS04/@decode,
                 "orderid",/X12/TS_850/BEG/BEG03,
                 "po_x005F_xml",/X12)
```

After the XQuery execution we can see a new record has been created in the table.

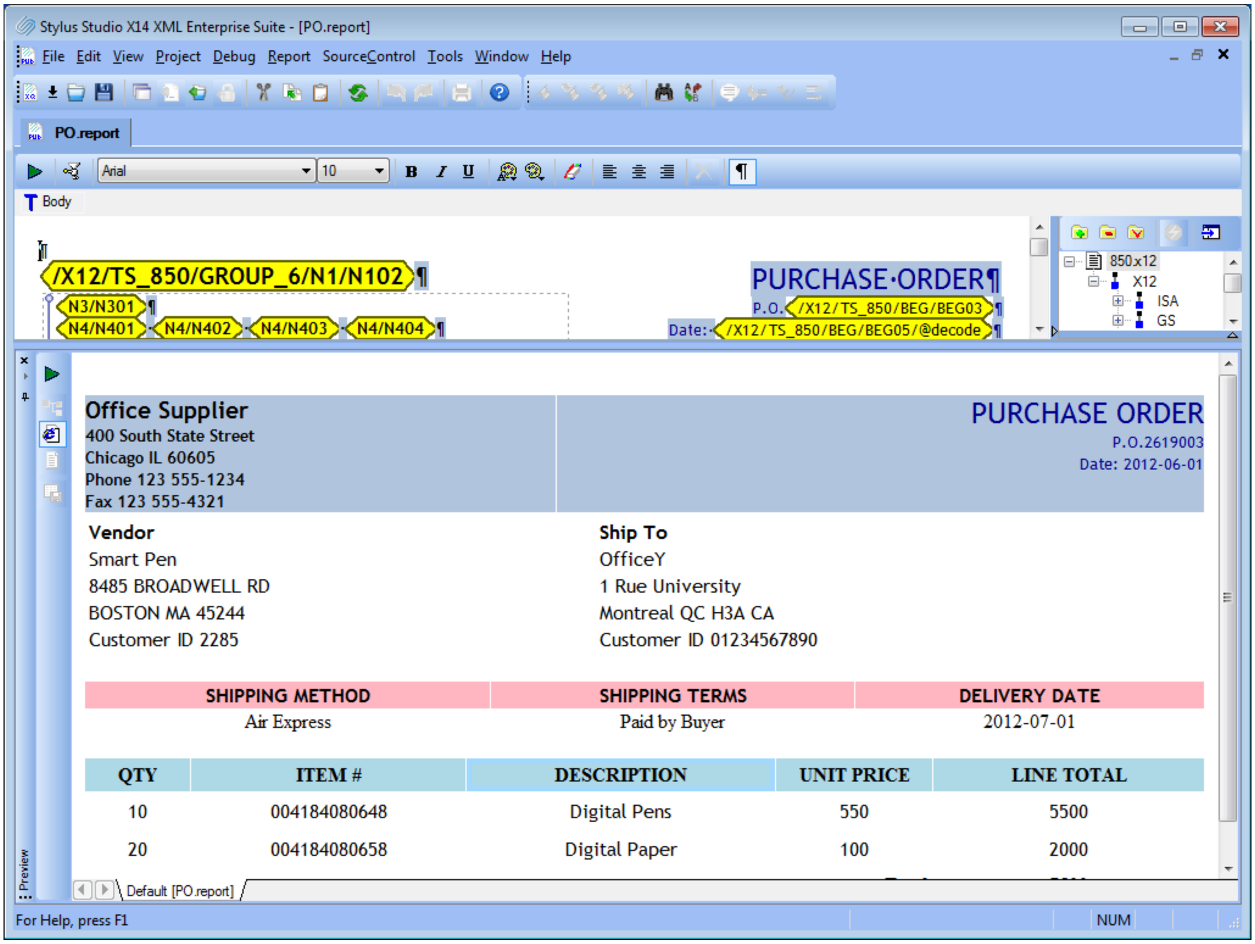


```sql
/****** Script for SelectTopNRows command from SSMS  ******/
SELECT TOP 1000 [id]
      ,[orderid]
      ,[date]
      ,[po_xml]
  FROM [acme].[dbo].[po]
```

	id	orderid	date	po_xml
1	11	2619003	2012-06-01	<X12><ISA><ISA01 decode="No Authorization Information Present (No M

Query executed successfully. | WIN7-DEV\SQLEXPRESS (10.0 SP3) | sa (55) | master | 00:00:00 | 1 rows

EDI and XML share similar benefits. They are great for making computer systems communicate, but human beings need some help to make this information easy to interpret. The following screenshot shows how Stylus Studio XML Publisher can be used to produce an appealing PDF document that can be used to display on the screen and on printed paper.


Stylus Studio X14 XML Enterprise Suite - [PO.report]
File Edit View Project Debug Report SourceControl Tools Window Help
PO.report
Arial
10
Body
/X12/TS_850/GROUP_6/N1/N102¶
N3/N301¶
N4/N401 N4/N402 N4/N403 N4/N404¶
PURCHASE·ORDER¶
P.O. /X12/TS_850/BEG/BEG03¶
Date: /X12/TS_850/BEG/BEG05/@decode¶
850x12
X12
ISA
GS
Preview
Default [PO.report]
For Help, press F1
NUM

Office Supplier
400 South State Street
Chicago IL 60605
Phone 123 555-1234
Fax 123 555-4321

PURCHASE ORDER
P.O.2619003
Date: 2012-06-01

Vendor
Smart Pen
8485 BROADWELL RD
BOSTON MA 45244
Customer ID 2285

Ship To
OfficeY
1 Rue University
Montreal QC H3A CA
Customer ID 01234567890

SHIPPING METHOD	SHIPPING TERMS	DELIVERY DATE
Air Express	Paid by Buyer	2012-07-01

QTY	ITEM #	DESCRIPTION	UNIT PRICE	LINE TOTAL
10	004184080648	Digital Pens	550	5500
20	004184080658	Digital Paper	100	2000

We hope you enjoyed reading this article. If you have any questions, do not hesitate to contact us.

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- Stylus Studio Team

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