

Washington State University Vancouver

## Hypothetical Case Study

### CON-WAY FREIGHT – PRJ 2

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11/9/15

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Database Diagram

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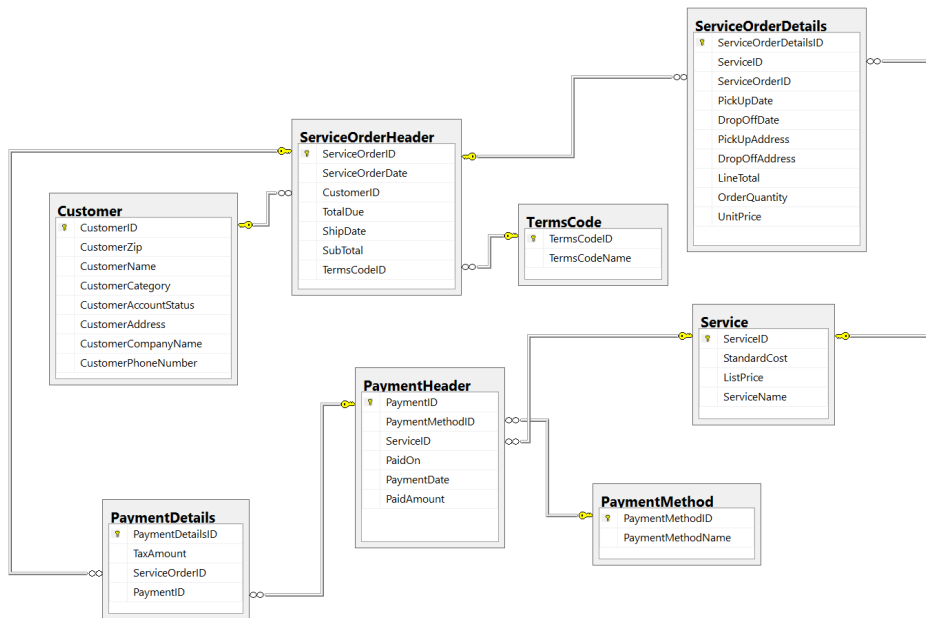


Figure PRJ2.1 Data Design - these tables store data related to the Con-Way ServiceOrder Process.

## Object Tables

### Customer and Service

## Transaction Tables

### PaymentHeader and ServiceOrderHeader

## Calculated Data

YTDPurchases is calculated as the sum of the TotalDue attribute in the ServiceOrderHeader table.

AccountStatus is calculated as the difference of the PaidAmount attribute in the PaymentHeader table and the TotalDue attribute of the ServiceOrderHeader table.

## Category Tables

### PaymentMethod and TermsCode

The **PaymentMethod** table implements the category pattern. Each value provided for its primary key attribute **PaymentMethodID** is associated with one of several mutually-exclusive categories. This primary key is the referential integrity target of a foreign key field **PaymentMethodID** in the transaction table **PaymentHeader**. This association effectively assigns each categorized record to one of the mutually exclusive categories listed in this table. This category table itself does not really represent an object or transaction of interest, but rather a predetermined list of available options.

The **TermsCode** table implements the category pattern. Each value provided for its primary key attribute, **TermsCodeID** is associated with one of several mutually-exclusive categories. This primary key is the referential integrity target of a foreign key field **TermsCodeID** in the transaction table, **ServiceOrderHeader**. This association effectively assigns each categorized record to one of the mutually exclusive categories listed in this table. This category table itself does not really represent an object or transaction of interest, but rather a predetermined list of available options.

## Intersection Tables

### ServiceOrderDetails and PaymentDetails

The **ServiceOrderDetails** intersection table supports a many-to-many relationship between the **Service** table, and the **ServiceOrderHeader** table. The intersection table itself is not a list of individual events or objects of interest, rather its purpose is to record details about a table that clarifies the many to many relationship of **ServiceOrderHeader** and **Service**. The **ServiceOrderDetails** table has its own primary key (which usually means very little by itself) and has two foreign key attributes, **ServiceID** which points to the primary key of **Service**, and **ServiceOrderID** which points to the primary key of **ServiceOrderHeader**.

The **PaymentDetails** intersection table supports a many-to-many relationship between the **PaymentHeader** table and the **ServiceOrderHeader** table. The intersection table itself is not a list of individual events or objects of interest, rather its purpose is to clarify the many to many relationship between **ServiceOrderHeader** table and **Service** table. It has its own primary key (which is usually means very little by itself) and has three foreign keys attributes **CustomerID** which points to the primary key of **Customer**, the **ServiceID** which points to the primary key of **Service**, and **PaymentMethodID** which points to the primary key of **PaymentMethod**.

### Service Order Report

The purpose of the Service Order Report is to create a report that shows the customer and Conway the outline of who the service was for, basic shipment information, a broken down cost of the service. Also, the report provides the final price that the customer will be billed. The Service Order report is coming from Figure 3 "Sales Order" in the 'Order Entry' flowchart within the 'Data' swim lane. The Service Order is sent to the customer for their records, and for the customer to know how much they owe Conway. Also, Conway keeps a copy of the Service Order to keep for accounting records, and management review. The Service Order report displays Information about the customer such as company name and customer name. The report also presents the details about the shipment such as Service ID, Service name, Unit price, Quantity, line total, and totals of the Service Order.


		<h1>Invoice</h1>		
AdTech II, Portland, OR 97209 800 426-6929 Fax: 888-890-3874		Date: 10/14/2015 Service Order ID: 1002		
Bill to: KERSHAW Hank Crecker				
Shipment Description				
Service ID	Service Name	Unit Price	Quantity	Line Total
1	Level 1	\$ 456.54	2	\$ 913.08
1	Level 1	\$ 359.47	3	\$ 1,078.41
3	Level 3	\$ 589.86	4	\$ 2,359.44
Comments:			Subtotal: \$	4,350.93
			Tax: \$	348.07
			Total: \$	4,699.00

Figure PRJ2.2 Service Order Report - This report shows the details of a ServiceOrder.

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## SQL Queries

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*/\* this code generates the header \*/*

```
SELECT TOP (100) PERCENT dbo.ServiceOrderHeader.ServiceOrderID,  
dbo.Customer.CustomerName, dbo.ServiceOrderHeader.ServiceOrderDate,  
dbo.ServiceOrderHeader.TotalDue  
FROM   dbo.Customer INNER JOIN  
        dbo.ServiceOrderHeader ON dbo.Customer.CustomerID =  
dbo.ServiceOrderHeader.CustomerID  
WHERE  (dbo.ServiceOrderHeader.ServiceOrderID = 1002)  
ORDER BY dbo.ServiceOrderHeader.ServiceOrderID
```

ServiceOrderID	CustomerName	ServiceOrderDate	TotalDue
1002	Hank Crecker	10/14/2015	\$ 4699.0044

Table PRJ2.3 Query to generate the top of the Service Order Report.

*/\* this code below generates the totals \*/*

```
SELECT TOP (100) PERCENT dbo.ServiceOrderDetails.ServiceID, dbo.Service.ServiceName,  
dbo.ServiceOrderDetails.OrderQuantity, dbo.ServiceOrderDetails.UnitPrice,  
dbo.ServiceOrderDetails.LineTotal, dbo.ServiceOrderDetails.ServiceOrderID  
FROM   dbo.Service INNER JOIN  
        dbo.ServiceOrderDetails ON dbo.Service.ServiceID =  
dbo.ServiceOrderDetails.ServiceID  
WHERE  (dbo.ServiceOrderDetails.ServiceOrderID = 1002)  
ORDER BY dbo.ServiceOrderDetails.ServiceID
```

ServiceID	ServiceOrderID	ServiceName	OrderQuantity	UnitPrice	LineTotal
1	1002	Level 1	2	\$ 456.54	\$ 913.08
1	1002	Level 1	3	\$ 359.47	\$ 1,078.41
3	1002	Level 3	4	\$ 589.86	\$ 2,359.44

Table PRJ2.4 Query to generate the main part of the Service Order Report.

*Example Database Data*

Table PRJ2.5 Customer object table with example data. CustomerName Hank Crecker is included in the sample report above.

CustomerID	CustomerZip	Customer Name	Customer Category	CustomerAccount Status	Customer Address	CustomerCompanyName	CustomerPhone Number
1	98664	Hank Crecker	Premier	GoodStanding	16011 NE 133rd CT Brush Prairie WA	Kershaw	9345647
2	98682	Will Armstrong	Tertiary	Delinquent	9783 SE 29th CR Vancouver WA	Fred Myers	7654323
3	98661	Roger Ponts	Secondary	PastDue	2040 Swiss Lane Blvd Portland OR	Blue Castle Cafe	1634543
4	98684	Lile Topps	General	NewCustomer	16445 11th AVE Beaverton OR	Microsoft	1837564

Table PRJ2.6 PaymentDetails intersection table with example data. Payment ID and ServiceOrderID are highlighted in green, showing that PaymentID has a 1:M relationship to ServiceOrderID.

PaymentDetailsID	TaxAmount	CustomerID	ServiceOrderID	PaymentID
3	\$15.55	4	3	2
4	\$155.55	2	1	2
5	\$499.84	3	2	3

Table PRJ2.7 PaymentHeader with example data. The payment header is a transaction table that connects PaymentDetails and Service tables.

PaymentID	PaymentMethodID	ServiceID	PaidOn	CustomerID	PaymentDate	PaidAmount
1	2	1	10/31/2015	2	1/5/2016	\$ 4,699.00
2	2	2	11/30/2015	3	11/30/2015	\$ 7,687.45
3	3	3	9/15/2015	1	9/10/2015	\$ 2,343.76

Table PRJ2.8 PaymentMethod with example data. The PaymentMethod is a category table that informs the user as to which payment method was executed for particular Payment.

PaymentMethodID	PaymentMethodName
1	VISA
2	CASH
3	MASTERCARD

Table PRJ2.9 Service, an object table with sample data that provides information for ServiceOrderDetails and PaymentHeader. ServiceID 1 and 3 are included in the sample report above.

ServiceID	StandardCost	ListPrice	ServiceName
1	\$299.99	\$359.47	Level 1
2	\$399.99	\$456.54	Level 2
3	\$499.99	\$589.86	Level 3
4	\$599.99	\$999.99	Level 4
5	\$299.99	\$359.47	Level 1

Table PRJ2.10 ServiceOrderHeader is a transaction table with example data. ServiceOrderHeaderID 1002 was used in sample report above.

ServiceOrderID	ServiceOrderDate	Customer	TotalDue	ShipDate	SubTotal	TermsCodeID
1	10/31/2015	1	4699.004	11/3/2015	4350.93	4
2	11/3/2015	2	256.67	11/7/2015	225.1	2
3	11/5/2015	3	2504.54	11/20/2015	2100	1
1002	10/14/2015	1	4699.004	11/1/2015	4350.93	3



Table PRJ2.11 TermsCode is a category table, with included sample data, which provides the TermCodeName applied to the ServiceOrder according to the TermsCodeID chosen.

TermsCodeID	TermsCodeName
1	2/10NET30
2	2/10 net 15
3	2/10 net10
4	3/15net30

Table PRJ2.12 ServiceOrderDetails table with example data. This table is an intersection table that reconciles a M:M relationship between ServiceOrderHeader table and Service table. Yellow highlights demonstrate one ServiceID with many ServiceOrderID, while the blue highlights demonstrate one ServiceOrderID with many ServiceID.

Service Order DetailsID	ServiceID	Service OrderID	PickUpDate	DropOffDate	PickUpAddress	DropOffAddress	LineTotal	Order Quantity	UnitPrice
1	1	1002	12/25/2015	1/1/2016	19111 Cantrall Road Little Rock AR	7104 McNeil Dr Austin TX	\$913.08	2	\$456.54
4	1	2	11/19/2015	12/2/2012	13548 SW Bard St. Portland OR	60554 Charlton Blvd North Madison WI	\$359.47	1	\$359.47
5	3	1	1/3/2016	1/22/2016	14605 SW Weir Rd. Beaverton OR	2296 Rockbrook Dr 200 Lewisville TX	\$3539.16	6	\$589.86
6	1	1002	12/25/2015	1/1/2016	19111 Cantrall Road Little Rock AR	7104 McNeil Dr Austin TX	\$1078.41	3	\$359.47
7	3	1002	12/25/2015	1/1/2016	19111 Cantrall Road Little Rock AR	7104 McNeil Dr Austin TX	\$2359.44	4	\$589.86



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*Create Table Scripts with Data*

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```
USE [harvey]
GO
```

```
/****** Object: Table [dbo].[Customer]    Script Date: 11/9/2015 3:31:30 PM *****/
SET ANSI_NULLS ON
GO
```

```
SET QUOTED_IDENTIFIER ON
GO
```

```
CREATE TABLE [dbo].[Customer](
    [CustomerID] [int] IDENTITY(1,1) NOT NULL,
    [CustomerZip] [int] NULL,
    [CustomerName] [nvarchar](20) NULL,
    [CustomerCategory] [nvarchar](10) NULL,
    [CustomerAccountStatus] [nvarchar](20) NULL,
    [CustomerAddress] [nvarchar](50) NULL,
    [CustomerCompanyName] [nvarchar](50) NULL,
    [CustomerPhoneNumber] [int] NULL,
    CONSTRAINT [PK_Customer] PRIMARY KEY CLUSTERED
(
    [CustomerID] ASC
)WITH (PAD_INDEX = OFF, STATISTICS_NORECOMPUTE = OFF, IGNORE_DUP_KEY = OFF,
ALLOW_ROW_LOCKS = ON, ALLOW_PAGE_LOCKS = ON) ON [PRIMARY]
) ON [PRIMARY]
```

```
/****** Object: Table [dbo].[PaymentDetails]    Script Date: 11/9/2015 3:49:09 PM
*****/
```

```
SET ANSI_NULLS ON
GO
```

```
SET QUOTED_IDENTIFIER ON
GO
```

```
CREATE TABLE [dbo].[PaymentDetails](
    [PaymentDetailsID] [int] IDENTITY(1,1) NOT NULL,
    [TaxAmount] [money] NOT NULL,
    [ServiceOrderID] [int] NULL,
    [PaymentID] [int] NULL,
    CONSTRAINT [PK_Invoice] PRIMARY KEY CLUSTERED
(
    [PaymentDetailsID] ASC
)WITH (PAD_INDEX = OFF, STATISTICS_NORECOMPUTE = OFF, IGNORE_DUP_KEY = OFF,
ALLOW_ROW_LOCKS = ON, ALLOW_PAGE_LOCKS = ON) ON [PRIMARY]
) ON [PRIMARY]
```

```
GO
```

```
ALTER TABLE [dbo].[PaymentDetails] WITH CHECK ADD CONSTRAINT
[FK_PaymentDetails_Payment] FOREIGN KEY([PaymentID])
```

```

REFERENCES [dbo].[PaymentHeader] ([PaymentID])
GO

ALTER TABLE [dbo].[PaymentDetails] CHECK CONSTRAINT [FK_PaymentDetails_Payment]
GO

ALTER TABLE [dbo].[PaymentDetails] WITH CHECK ADD CONSTRAINT
[FK_PaymentDetails_ServiceOrder] FOREIGN KEY([ServiceOrderID])
REFERENCES [dbo].[ServiceOrderHeader] ([ServiceOrderID])
GO

ALTER TABLE [dbo].[PaymentDetails] CHECK CONSTRAINT [FK_PaymentDetails_ServiceOrder]
GO

/***** Object: Table [dbo].[PaymentHeader]    Script Date: 11/9/2015 3:32:33 PM *****/
SET ANSI_NULLS ON
GO

SET QUOTED_IDENTIFIER ON
GO

CREATE TABLE [dbo].[PaymentHeader](
    [PaymentID] [int] IDENTITY(1,1) NOT NULL,
    [PaymentMethodID] [int] NULL,
    [ServiceID] [int] NULL,
    [PaidOn] [date] NULL,
    [CustomerID] [int] NULL,
    [PaymentDate] [date] NULL,
    [PaidAmount] [money] NULL,
    CONSTRAINT [PK_InvoiceDetails] PRIMARY KEY CLUSTERED
(
    [PaymentID] ASC
)WITH (PAD_INDEX = OFF, STATISTICS_NORECOMPUTE = OFF, IGNORE_DUP_KEY = OFF,
ALLOW_ROW_LOCKS = ON, ALLOW_PAGE_LOCKS = ON) ON [PRIMARY]
) ON [PRIMARY]
GO

ALTER TABLE [dbo].[PaymentHeader] WITH CHECK ADD CONSTRAINT
[FK_InvoiceDetails_PaymentMethod] FOREIGN KEY([PaymentMethodID])
REFERENCES [dbo].[PaymentMethod] ([PaymentMethodID])
GO

ALTER TABLE [dbo].[PaymentHeader] CHECK CONSTRAINT [FK_InvoiceDetails_PaymentMethod]
GO

ALTER TABLE [dbo].[PaymentHeader] WITH CHECK ADD CONSTRAINT [FK_InvoiceDetails_Service]
FOREIGN KEY([ServiceID])
REFERENCES [dbo].[Service] ([ServiceID])
GO

ALTER TABLE [dbo].[PaymentHeader] CHECK CONSTRAINT [FK_InvoiceDetails_Service]
GO

ALTER TABLE [dbo].[PaymentHeader] WITH CHECK ADD CONSTRAINT [FK_PaymentHeader_Customer]
FOREIGN KEY([CustomerID])
REFERENCES [dbo].[Customer] ([CustomerID])

```

GO

```
ALTER TABLE [dbo].[PaymentHeader] CHECK CONSTRAINT [FK_PaymentHeader_Customer]
GO
```

```
/****** Object: Table [dbo].[PaymentMethod]    Script Date: 11/9/2015 3:33:04 PM *****/
SET ANSI_NULLS ON
GO
```

```
SET QUOTED_IDENTIFIER ON
GO
```

```
CREATE TABLE [dbo].[PaymentMethod](
    [PaymentMethodID] [int] IDENTITY(1,1) NOT NULL,
    [PaymentMethodName] [nvarchar](10) NULL,
    CONSTRAINT [PK_PaymentMethod] PRIMARY KEY CLUSTERED
(
    [PaymentMethodID] ASC
)WITH (PAD_INDEX = OFF, STATISTICS_NORECOMPUTE = OFF, IGNORE_DUP_KEY = OFF,
ALLOW_ROW_LOCKS = ON, ALLOW_PAGE_LOCKS = ON) ON [PRIMARY]
) ON [PRIMARY]
```

GO

```
/****** Object: Table [dbo].[Service]    Script Date: 11/9/2015 3:33:33 PM *****/
SET ANSI_NULLS ON
GO
```

```
SET QUOTED_IDENTIFIER ON
GO
```

```
CREATE TABLE [dbo].[Service](
    [ServiceID] [int] IDENTITY(1,1) NOT NULL,
    [StandardCost] [money] NOT NULL,
    [ListPrice] [money] NOT NULL,
    [ServiceName] [nvarchar](20) NULL,
    CONSTRAINT [PK_Service] PRIMARY KEY CLUSTERED
(
    [ServiceID] ASC
)WITH (PAD_INDEX = OFF, STATISTICS_NORECOMPUTE = OFF, IGNORE_DUP_KEY = OFF,
ALLOW_ROW_LOCKS = ON, ALLOW_PAGE_LOCKS = ON) ON [PRIMARY]
) ON [PRIMARY]
```

GO

```
/****** Object: Table [dbo].[ServiceOrderDetails]    Script Date: 11/9/2015 3:34:03 PM
*****/
```

```
SET ANSI_NULLS ON
GO
```

```
SET QUOTED_IDENTIFIER ON
GO
```

```
CREATE TABLE [dbo].[ServiceOrderDetails](
    [ServiceOrderDetailsID] [int] IDENTITY(1,1) NOT NULL,
```

```

        [ServiceID] [int] NULL,
        [ServiceOrderID] [int] NULL,
        [PickUpDate] [date] NULL,
        [DropOffDate] [date] NULL,
        [PickUpAddress] [nvarchar](70) NULL,
        [DropOffAddress] [nvarchar](70) NULL,
        [LineTotal] [money] NULL,
        [OrderQuantity] [int] NULL,
        [UnitPrice] [money] NULL,
    CONSTRAINT [PK_ServiceOrderDetails] PRIMARY KEY CLUSTERED
    (
        [ServiceOrderDetailsID] ASC
    )WITH (PAD_INDEX = OFF, STATISTICS_NORECOMPUTE = OFF, IGNORE_DUP_KEY = OFF,
    ALLOW_ROW_LOCKS = ON, ALLOW_PAGE_LOCKS = ON) ON [PRIMARY]
    ) ON [PRIMARY]

GO

ALTER TABLE [dbo].[ServiceOrderDetails] WITH CHECK ADD CONSTRAINT
[FK_ServiceOrderDetails_Service] FOREIGN KEY([ServiceID])
REFERENCES [dbo].[Service] ([ServiceID])
GO

ALTER TABLE [dbo].[ServiceOrderDetails] CHECK CONSTRAINT [FK_ServiceOrderDetails_Service]
GO

ALTER TABLE [dbo].[ServiceOrderDetails] WITH CHECK ADD CONSTRAINT
[FK_ServiceOrderDetails_ServiceOrderHeader] FOREIGN KEY([ServiceOrderID])
REFERENCES [dbo].[ServiceOrderHeader] ([ServiceOrderID])
GO

ALTER TABLE [dbo].[ServiceOrderDetails] CHECK CONSTRAINT
[FK_ServiceOrderDetails_ServiceOrderHeader]
GO

/***** Object: Table [dbo].[ServiceOrderHeader]    Script Date: 11/9/2015 3:34:58 PM
*****/
SET ANSI_NULLS ON
GO

SET QUOTED_IDENTIFIER ON
GO

CREATE TABLE [dbo].[ServiceOrderHeader](
    [ServiceOrderID] [int] IDENTITY(1,1) NOT NULL,
    [ServiceOrderDate] [date] NULL,
    [CustomerID] [int] NULL,
    [TotalDue] [money] NULL,
    [ShipDate] [date] NULL,
    [SubTotal] [money] NULL,
    [TermsCodeID] [int] NULL,
    CONSTRAINT [PK_ServiceOrder] PRIMARY KEY CLUSTERED
    (
        [ServiceOrderID] ASC
    )WITH (PAD_INDEX = OFF, STATISTICS_NORECOMPUTE = OFF, IGNORE_DUP_KEY = OFF,
    ALLOW_ROW_LOCKS = ON, ALLOW_PAGE_LOCKS = ON) ON [PRIMARY]
    ) ON [PRIMARY]

```

GO

```
ALTER TABLE [dbo].[ServiceOrderHeader] WITH CHECK ADD CONSTRAINT
[FK_ServiceOrder_Customer] FOREIGN KEY([CustomerID])
REFERENCES [dbo].[Customer] ([CustomerID])
GO
```

```
ALTER TABLE [dbo].[ServiceOrderHeader] CHECK CONSTRAINT [FK_ServiceOrder_Customer]
GO
```

```
ALTER TABLE [dbo].[ServiceOrderHeader] WITH CHECK ADD CONSTRAINT
[FK_ServiceOrderHeader_TermsCode] FOREIGN KEY([TermsCodeID])
REFERENCES [dbo].[TermsCode] ([TermsCodeID])
GO
```

```
ALTER TABLE [dbo].[ServiceOrderHeader] CHECK CONSTRAINT [FK_ServiceOrderHeader_TermsCode]
GO
```

```
/***** Object: Table [dbo].[TermsCode]    Script Date: 11/9/2015 3:35:25 PM *****/
SET ANSI_NULLS ON
GO
```

```
SET QUOTED_IDENTIFIER ON
GO
```

```
CREATE TABLE [dbo].[TermsCode](
    [TermsCodeID] [int] IDENTITY(1,1) NOT NULL,
    [TermsCodeName] [text] NOT NULL,
    CONSTRAINT [PK_TermsCode] PRIMARY KEY CLUSTERED
(
    [TermsCodeID] ASC
)WITH (PAD_INDEX = OFF, STATISTICS_NORECOMPUTE = OFF, IGNORE_DUP_KEY = OFF,
ALLOW_ROW_LOCKS = ON, ALLOW_PAGE_LOCKS = ON) ON [PRIMARY]
) ON [PRIMARY] TEXTIMAGE_ON [PRIMARY]
GO
```

GO