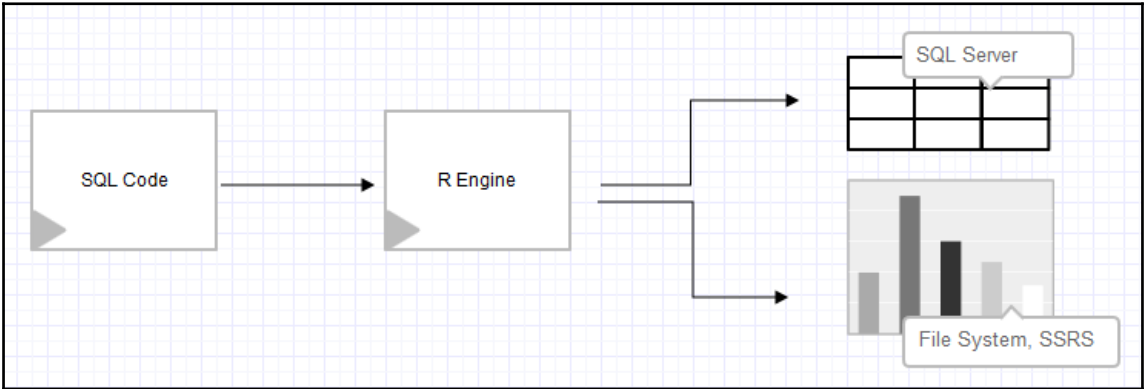
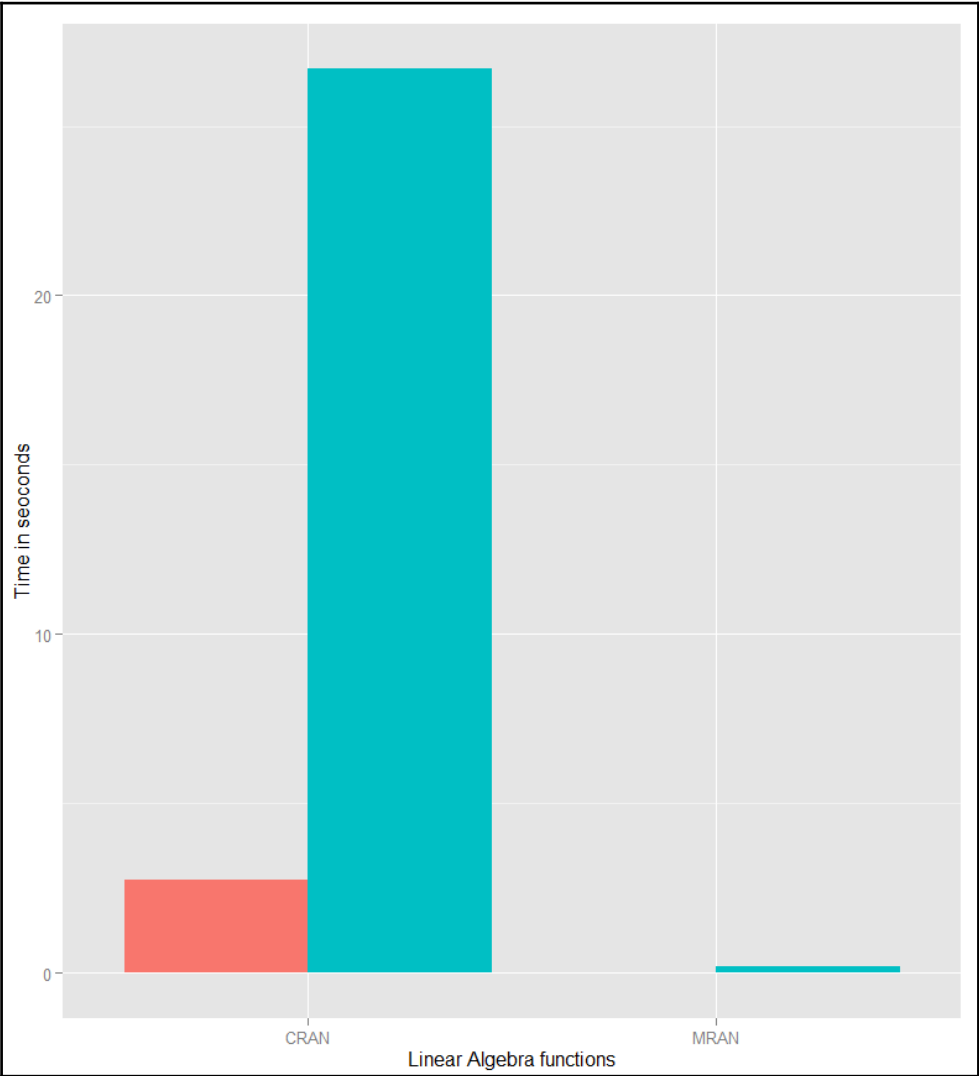


Chapter 1: Introduction to R and SQL Server



Chapter 2: Overview of Microsoft Machine Learning Server and SQL Server



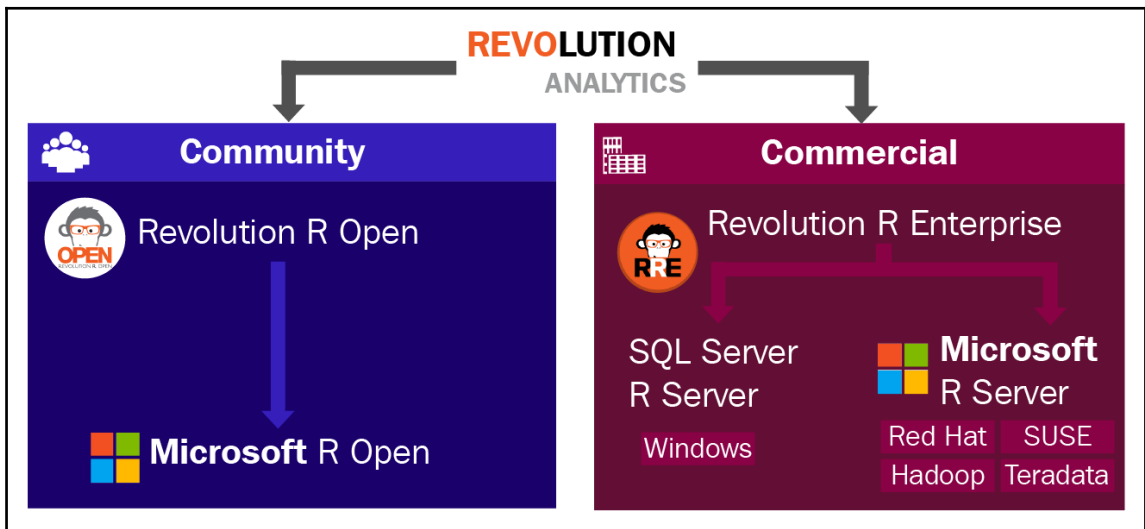
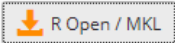
Microsoft R Open & MKL Downloads

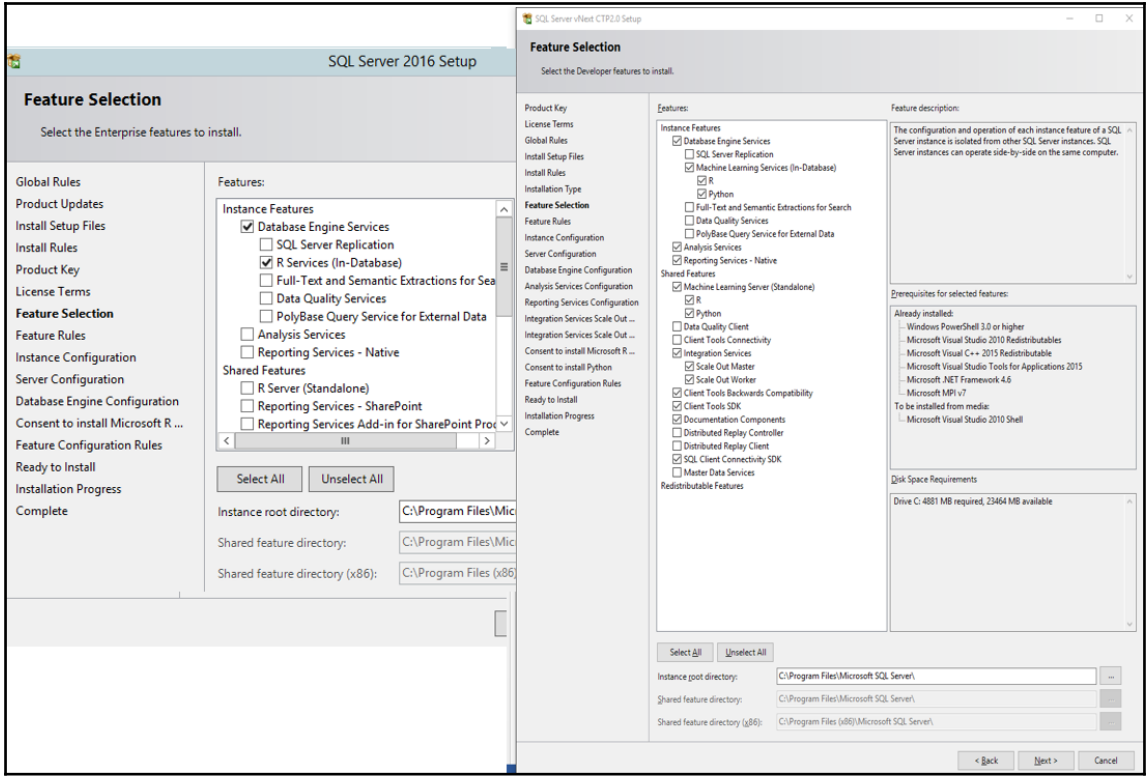
While the install of MKL, used for multithreaded performance, is **optional**, we recommend both Microsoft R Open & MKL for optimal performance on Windows and Linux. The OS X operating system has Math Libraries by default.

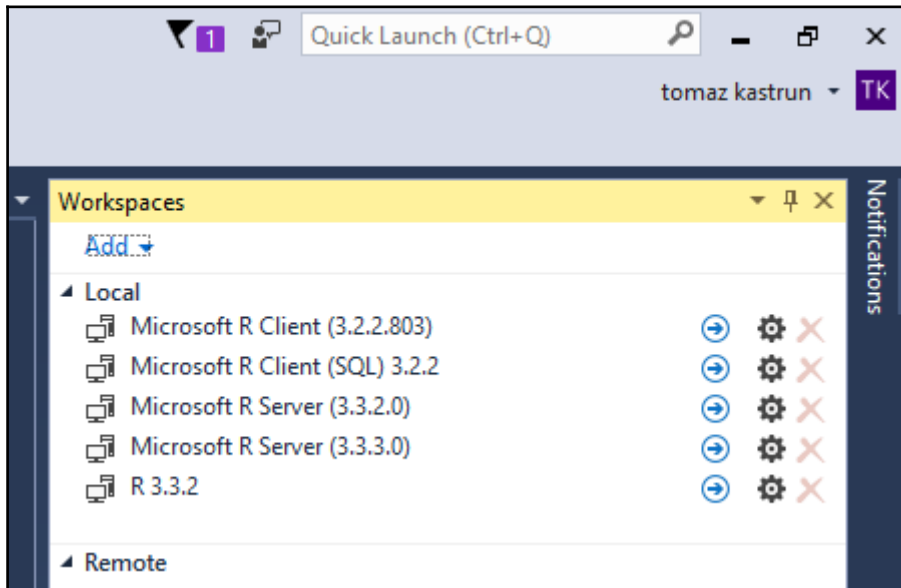
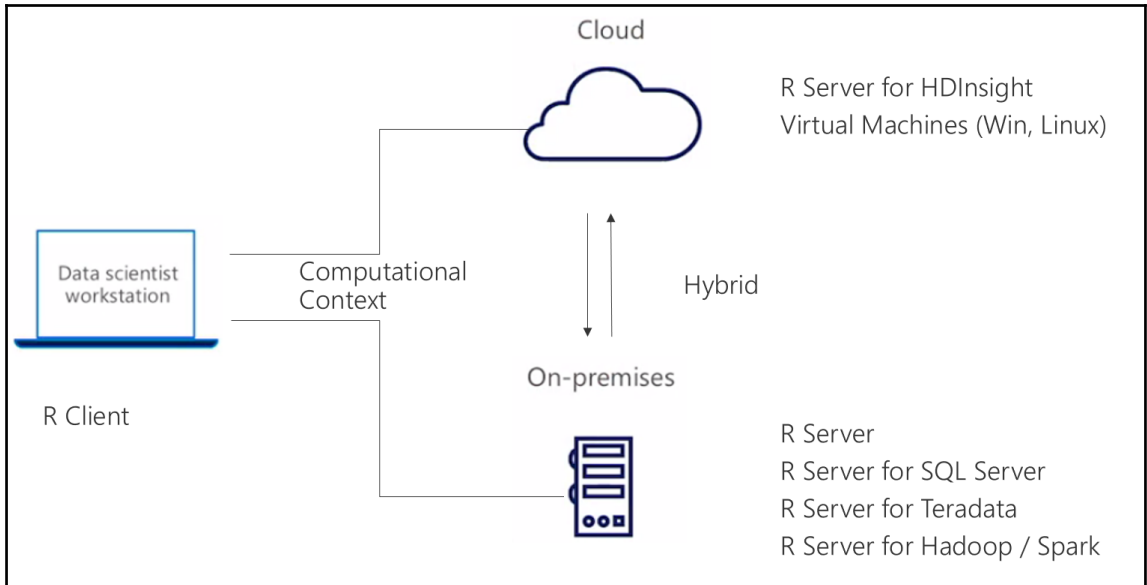
Platforms (64-Bit only)

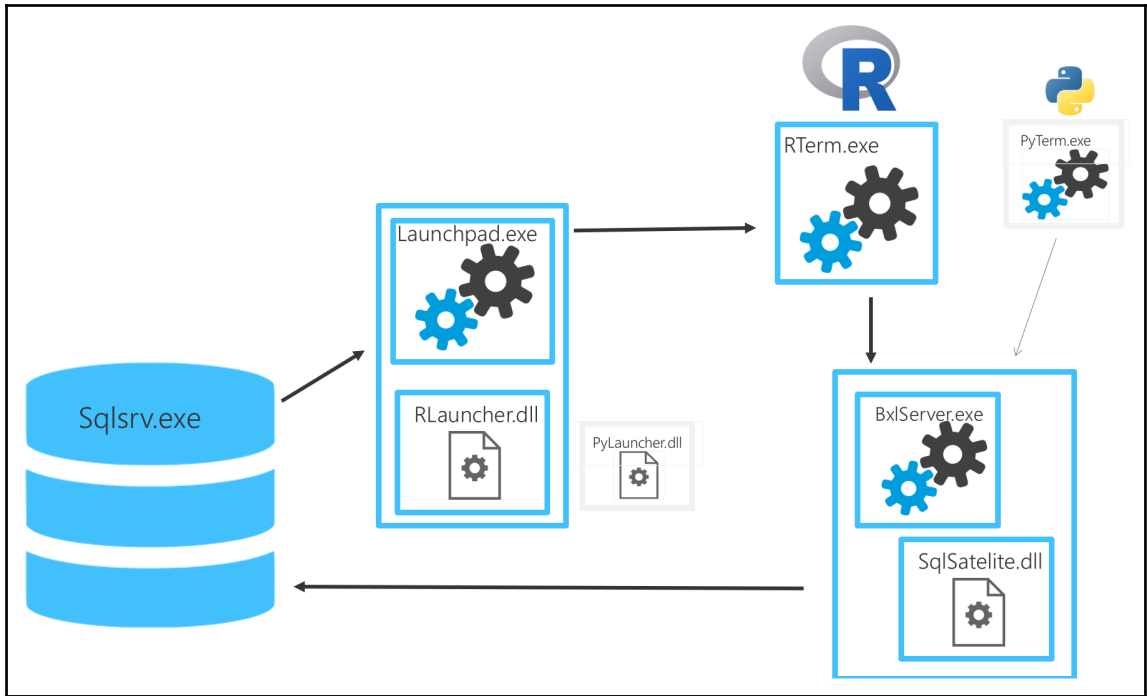
Downloads

Windows - Windows 7.0 (SP1), 8.1, 10 and Windows Server® 2008 R2 (SP1), 2012
SHA 256: 2c203421a9779e3f68066a6ab5cbf747c435dd54ec9b8454670bba7362b62623





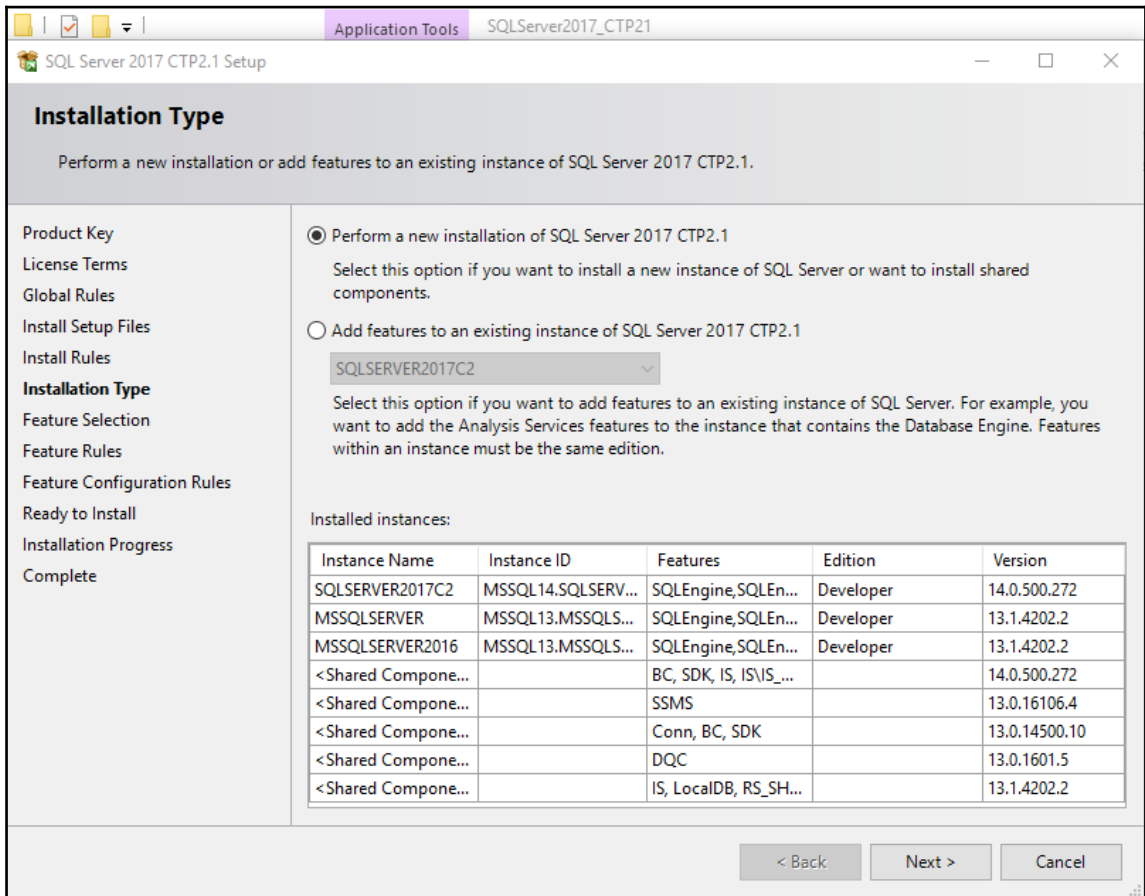




Launchpad.exe	6.38	81.456 K	8.400 K	9300
RTerm.exe		54.152 K	61.060 K	18160
conhost.exe		1.288 K	6.184 K	21420
BxlServer.exe		6.008 K	15.420 K	912
RTerm.exe	< 0.01	54.192 K	61.236 K	20444
conhost.exe		1.240 K	6.140 K	15100
BxlServer.exe	0.01	6.004 K	15.300 K	13808
RTerm.exe		54.180 K	61.100 K	20912
conhost.exe		1.232 K	5.980 K	9504
BxlServer.exe	< 0.01	6.032 K	15.556 K	16764
RTerm.exe		54.148 K	61.120 K	14676
conhost.exe		1.288 K	6.228 K	19792
BxlServer.exe	< 0.01	5.960 K	15.364 K	11292
RTerm.exe		54.156 K	61.004 K	13964
conhost.exe		1.288 K	6.016 K	13168
BxlServer.exe	< 0.01	5.972 K	15.228 K	11356
RTerm.exe	15.40	54.136 K	60.800 K	16592
conhost.exe	0.36	1.396 K	6.104 K	7612
BxlServer.exe	0.54	5.320 K	11.884 K	4272

```
RHOME=C:\Program Files\Microsoft SQL Server\MSSQL14.MSSQLSERVER\MSSQL\R_SERVICES
MPI_HOME=C:\Program Files\Microsoft MPI
INSTANCE_NAME=MSSQLSERVER
TRACE_LEVEL=1
JOB_CLEANUP_ON_EXIT=1
USER_POOL_SIZE=0
WORKING_DIRECTORY=C:\Program Files\Microsoft SQL Server\MSSQL14.MSSQLSERVER\MSSQL\ExtensibilityData
PKG_MGMT_MODE=0
```

Chapter 3: Managing Machine Learning Services for SQL Server 2017 and R



SQL Server 2017 Setup

Feature Selection

Select the Developer features to install.

- Global Rules
- Product Updates
- Install Setup Files
- Install Rules
- Installation Type
- Product Key
- License Terms
- Feature Selection**
- Feature Rules
- Feature Configuration Rules
- Ready to Install
- Installation Progress
- Complete

Looking for Reporting Services? [Download it from the web](#)

Features:

- Instance Features**
 - Database Engine Services
 - SQL Server Replication
 - Machine Learning Services (In-Database)
 - R
 - Python
 - Full-Text and Semantic Extractions for Search
 - Data Quality Services
 - PolyBase Query Service for External Data
 - Analysis Services
- Shared Features**
 - Machine Learning Server (Standalone)
 - R
 - Python
 - Data Quality Client
 - Client Tools Connectivity
 - Integration Services
 - Scale Out Master
 - Scale Out Worker
 - Client Tools Backwards Compatibility
 - Client Tools SDK
 - Distributed Replay Controller
 - Distributed Replay Client
 - SQL Client Connectivity SDK
 - Master Data Services
- Redistributable Features**

Feature description:

The configuration and operation of each instance feature of a SQL Server instance is isolated from other SQL Server instances. SQL Server instances can operate side-by-side on the same computer.

Prerequisites for selected features:

Disk Space Requirements

Select All Unselect All

Instance root directory: C:\Program Files\Microsoft SQL Server\

Shared feature directory: C:\Program Files\Microsoft SQL Server\

Shared feature directory (x86): C:\Program Files (x86)\Microsoft SQL Server\

< Back Next > Cancel

Feature Selection

Select the Developer features to install.

- Product Key
- License Terms
- Global Rules
- Install Setup Files
- Install Rules
- Installation Type
- Feature Selection**
- Feature Rules
- Feature Configuration Rules
- Ready to Install
- Installation Progress
- Complete

Looking for Reporting Services? [Download it from the web](#)

Features:

Instance Features

- Database Engine Services
 - SQL Server Replication
 - Machine Learning Services (In-Database)
 - R
 - Python
 - Full-Text and Semantic Extractions for Search
 - Data Quality Services
 - PolyBase Query Service for External Data
- Analysis Services

Shared Features

- Machine Learning Server (Standalone)
 - R
 - Python
- Data Quality Client
- Client Tools Connectivity
- Integration Services
 - Scale Out Master
 - Scale Out Worker
- Client Tools Backwards Compatibility
- Client Tools SDK
- Documentation Components
- Distributed Replay Controller
- Distributed Replay Client
- SQL Client Connectivity SDK
- Master Data Services

Redistributable Features

Feature description:

The configuration and open computer.

Prerequisites for selected features

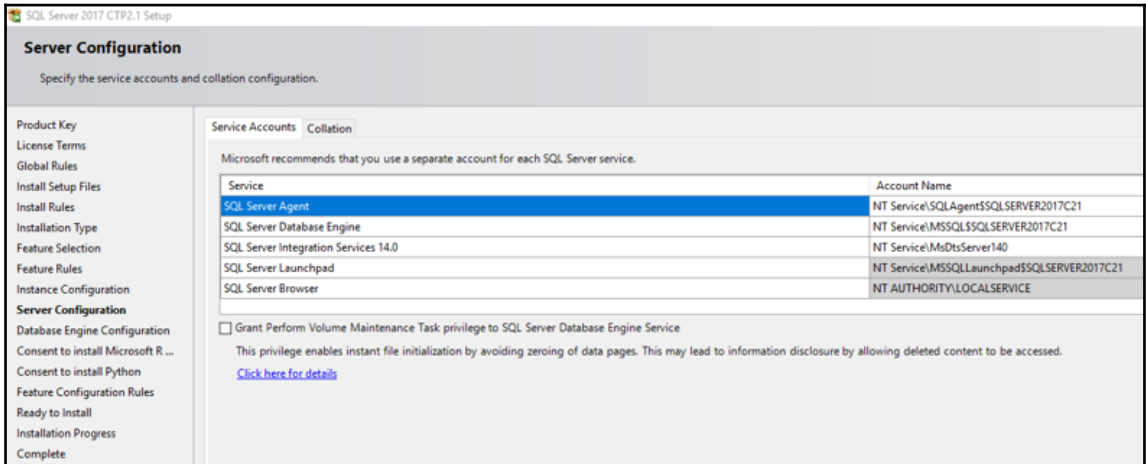
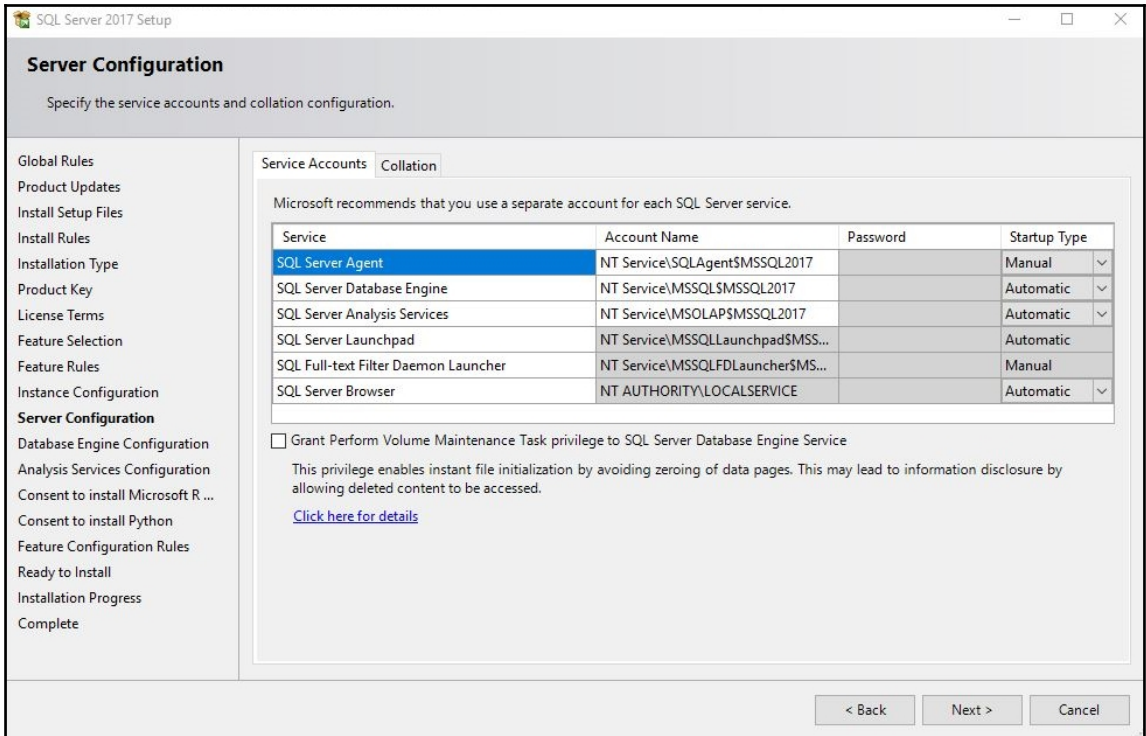
Disk Space Requirements

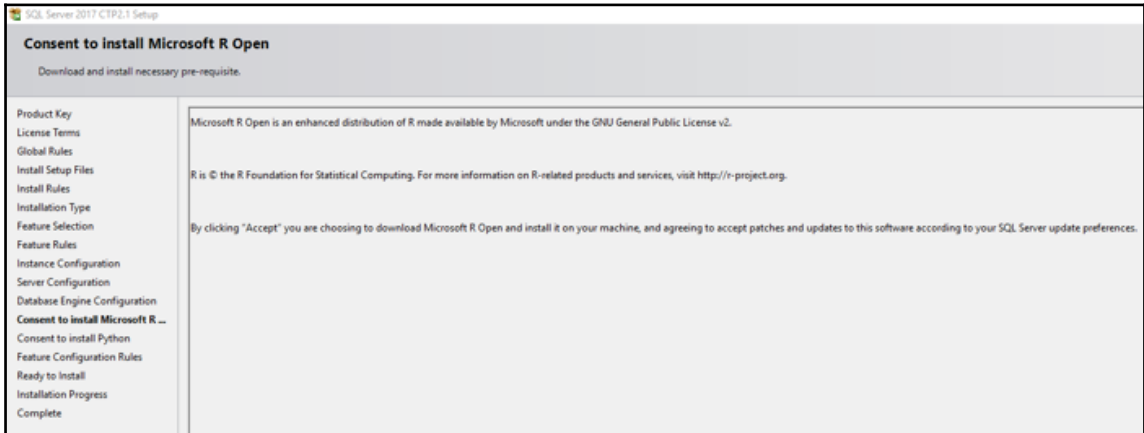
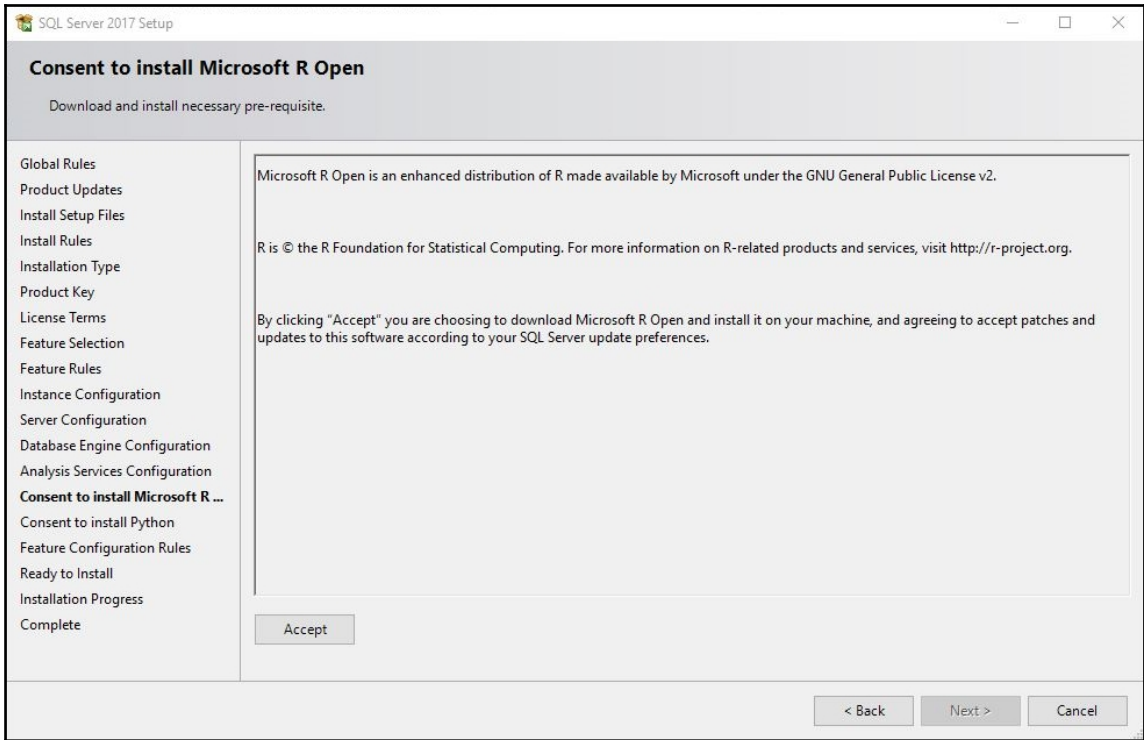
Select All Unselect All

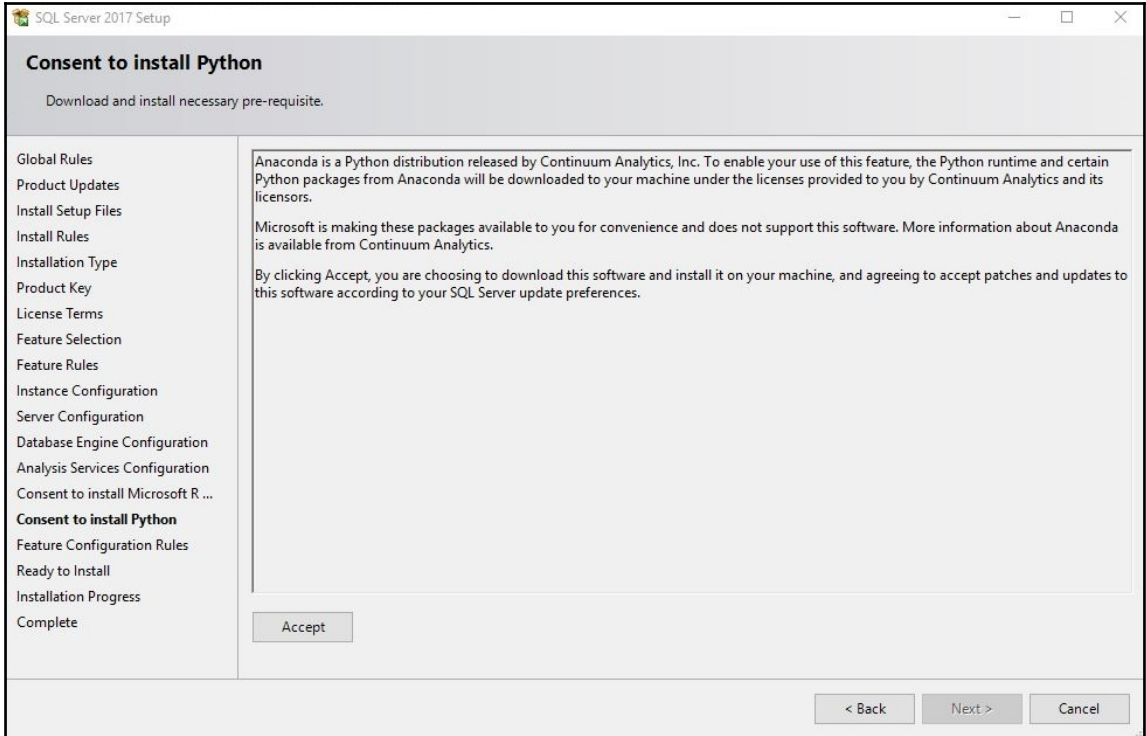
Instance root directory: C:\Program Files\Microsoft SQL Server\

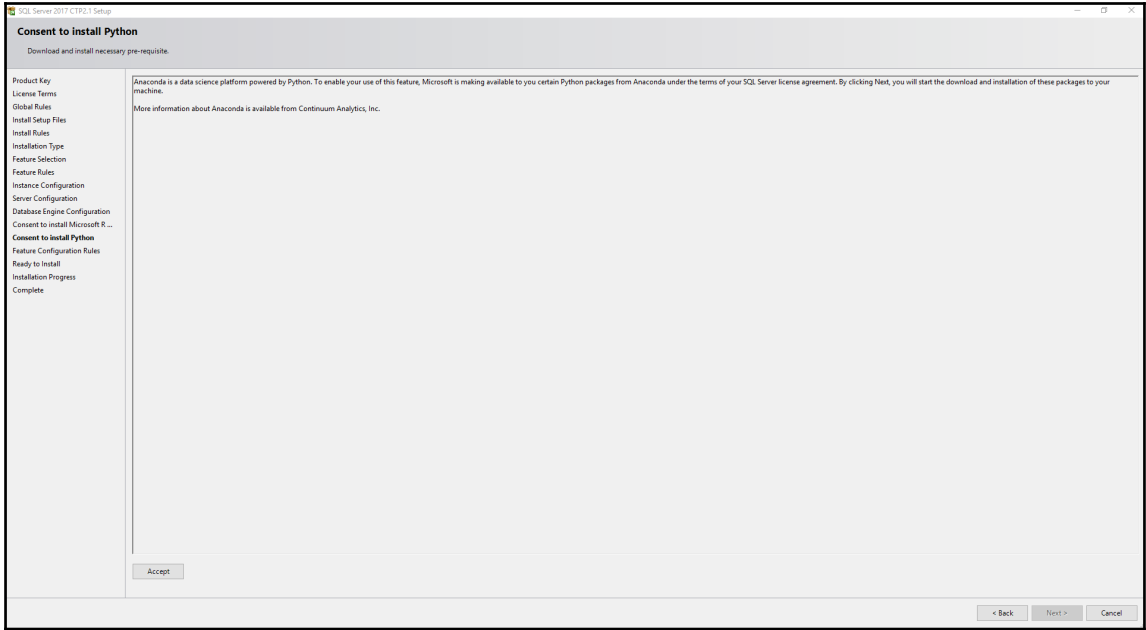
Shared feature directory: C:\Program Files\Microsoft SQL Server\

Shared feature directory (x86): C:\Program Files (x86)\Microsoft SQL Server\









SQL Server 2017 Setup

Ready to Install

Verify the SQL Server 2017 features to be installed.

- Global Rules
- Product Updates
- Install Setup Files
- Install Rules
- Installation Type
- Product Key
- License Terms
- Feature Selection
- Feature Rules
- Instance Configuration
- Server Configuration
- Database Engine Configuration
- Analysis Services Configuration
- Consent to install Microsoft R ...
- Consent to install Python
- Feature Configuration Rules
- Ready to Install**
- Installation Progress
- Complete

Ready to install SQL Server 2017:

- Summary
 - Edition: Developer
 - Action: Install (Product Update)
 - Prerequisites
 - Already installed:
 - Microsoft Visual C++ 2015 Redistributable
 - Windows PowerShell 3.0 or higher
 - Microsoft .NET Framework 4.6
 - Microsoft MPI v7
 - General Configuration
 - Features
 - Database Engine Services
 - Machine Learning Services (In-Database)
 - R
 - Python
 - Full-Text and Semantic Extractions for Search
 - Data Quality Services
 - Analysis Services
 - Instance configuration
 - Instance Name: MSSQL2017
 - Instance ID: MSSQL2017
 - Instance IDs
 - SQL Database Engine: MSSQL14.MSSQL2017
 - Analysis Services: MSAS14.MSSQL2017
 - Instance Directory: C:\Program Files\Microsoft SQL Server\
 - Shared component root directory
 - Shared feature directory: C:\Program Files\Microsoft SQL Server\
 - Shared feature (WOW64) directory: C:\Program Files (x86)\Microsoft SQL Server\
 - Product Update
 - Update Enabled: True
 - Update Source: MU
 - Instance configuration
 - Agent
 - Service Configuration
 - Account: NT Service\SQLAgentSMSSQL2017
 - Startup Type: Manual

Configuration file path:
C:\Program Files\Microsoft SQL Server\140\Setup Bootstrap\Log\20180222_204000\ConfigurationFile.ini

< Back Install Cancel

SQL Server 2017 CTP2.1 Setup

Ready to Install

Verify the SQL Server 2017 CTP2.1 features to be installed.

Product Key

- License Terms
- Global Rules
- Install Setup Files
- Install Rules
- Installation Type
- Feature Selection
- Feature Rules
- Instance Configuration
- Server Configuration
- Database Engine Configuration
- Consent to install Microsoft R...
- Consent to install Python
- Feature Configuration Rules
- Ready to Install**
- Installation Progress
- Complete

Ready to install SQL Server 2017 CTP2.1:

- Summary
 - Edition: Developer
 - Action: Install
- Prerequisites
 - Already installed:
 - Microsoft Visual C++ 2015 Redistributable
 - Windows PowerShell 3.0 or higher
 - Microsoft Visual Studio 2010 Redistributables
 - Microsoft Visual Studio Tools for Applications 2015
 - Microsoft .NET Framework 4.6
 - Microsoft MPI v7
- General Configuration
 - Features
 - Database Engine Services
 - Machine Learning Services (In-Database)
 - R
 - Python
 - Machine Learning Server (Standalone)
 - Integration Services
 - Instance configuration
 - Instance Name: SQLSERVER2017C21
 - Instance ID: SQLSERVER2017C21
 - Instance ID3:
 - SQL Database Engine MSSQL14.SQLSERVER2017C21
 - Instance Directory: C:\Program Files\Microsoft SQL Server\
 - Shared component root directory
 - Shared feature (DOWNS) directory: C:\Program Files\Microsoft SQL Server\
 - Shared feature (DOWNS) directory: C:\Program Files (x86)\Microsoft SQL Server\
 - Product Update
 - Update Enabled: False
 - Update Source: MU
 - Instance configuration
 - Agent
 - Service Configuration
 - Account: NT Service\SQLAgent\$SQLSERVER2017C21
 - Startup Type: Manual
 - Database Engine
 - Service Configuration
 - Account: NT Service\MSSQL\$SQLSERVER2017C21
 - Startup Type: Automatic
 - Instant File Initialization: False
 - Directory
 - System database directory: C:\Program Files\Microsoft SQL Server\MSSQL14.SQLSERVER2017C21\MSSQL\Data

Configuration file path:
C:\Program Files\Microsoft SQL Server\140\Setup Bootstrap\Log\20170623_081337\ConfigurationFile.ini

< Back Install Cancel

SQL Server 2017 CTP2.1 Setup

Complete

Your SQL Server 2017 CTP2.1 installation completed successfully.

Information about the Setup operation or possible next steps:

Feature	Status
Python	Succeeded
R	Succeeded
Machine Learning Services (In-Database)	Succeeded
Database Engine Services	Succeeded
Integration Services	Succeeded
SQL Browser	Succeeded

Computer restart required

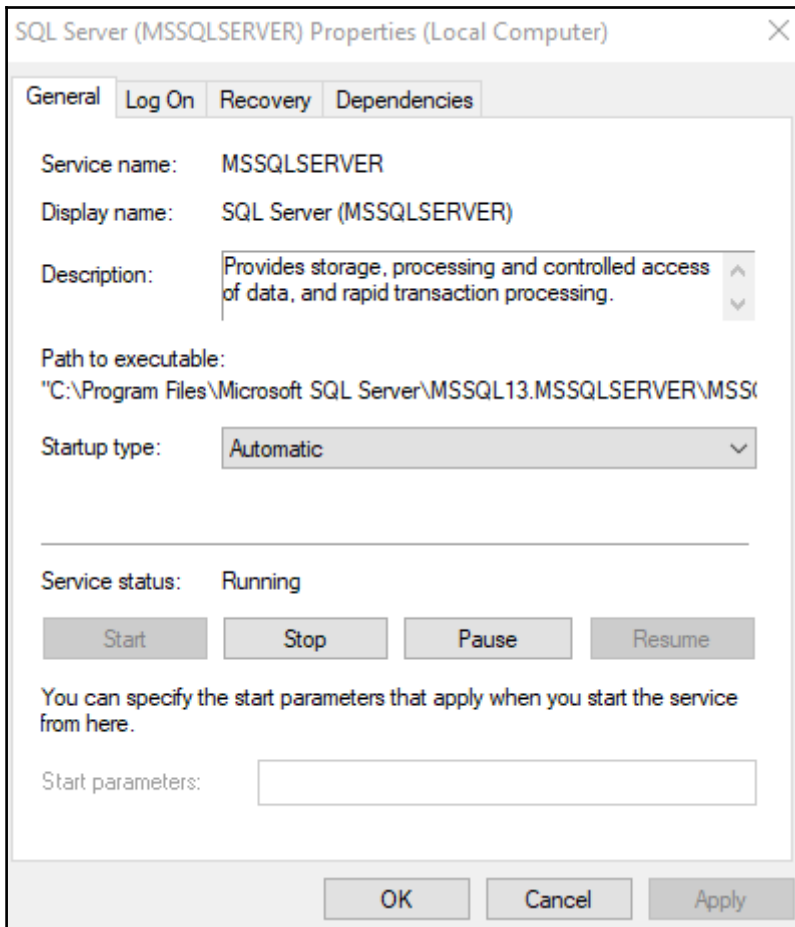
One or more affected files have operations pending. You must restart your computer after the setup process is completed.

OK

Summary log file has been saved to the following location:
C:\Program Files\Microsoft SQL Server\140\Setup Bootstrap\Log\20170623_081337\Summary_SICN-KASTRUN_20170623_081337.txt

Close

name	minimum	maximum	config_value	run_value
external scripts enabled	0	1	1	1



	Res
1	1
2	2

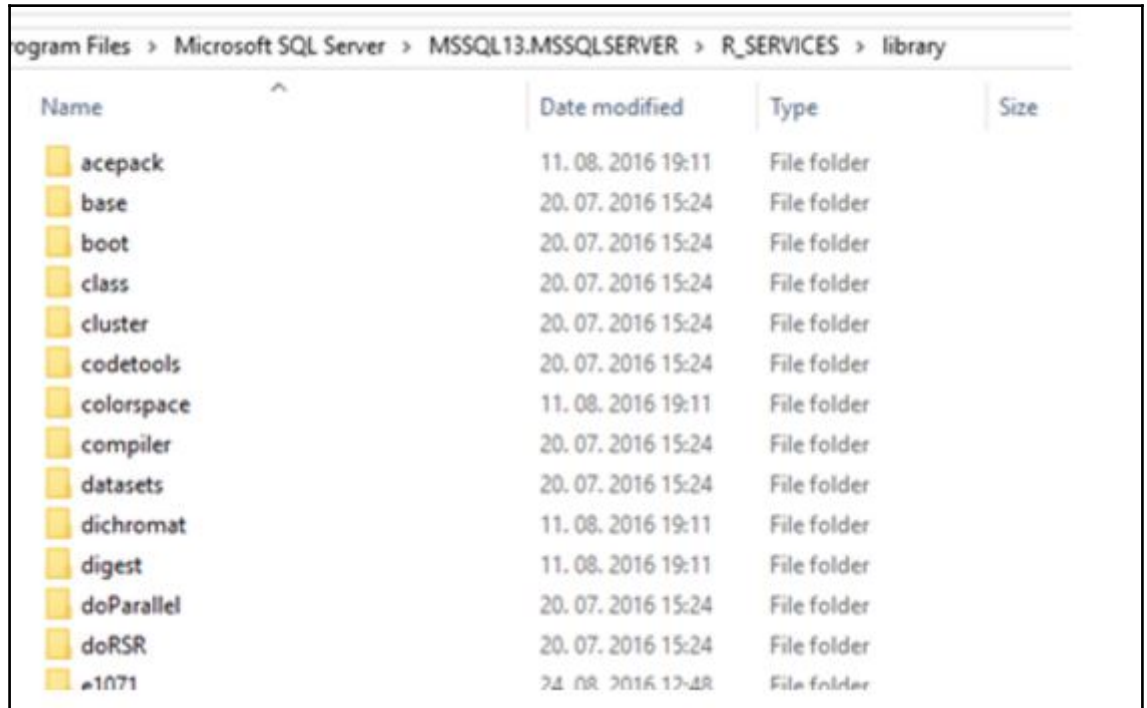
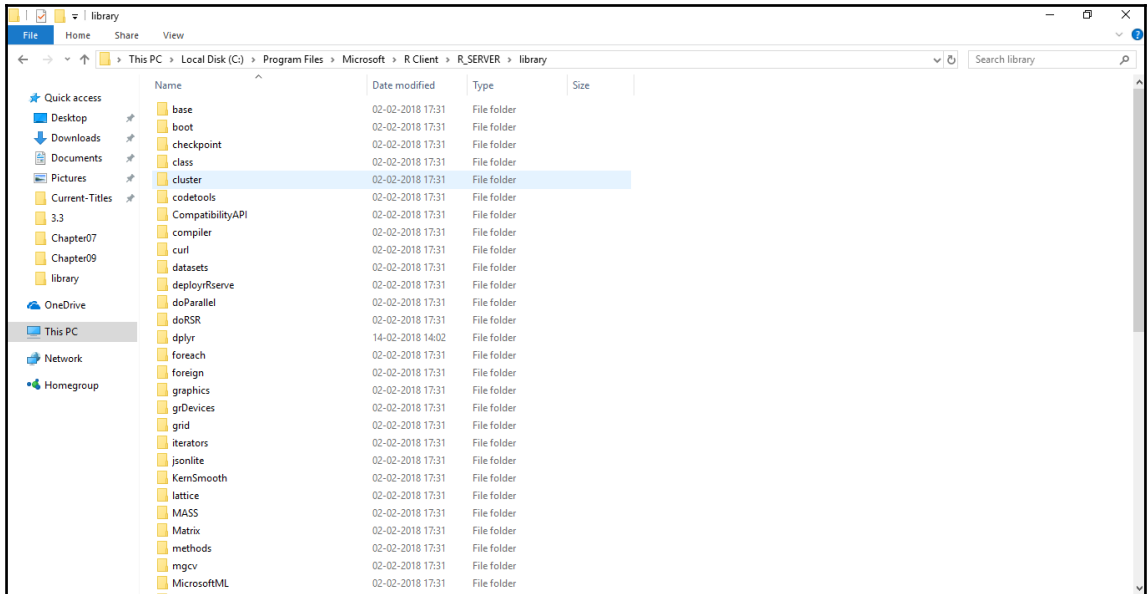
```
Editor Messages
STDERR message(s) from external script:
Warning: unable to access index for repository https://mran.microsoft.com/snapshot/2017-05-01/src/contrib:
cannot open URL 'https://mran.microsoft.com/snapshot/2017-05-01/src/contrib/PACKAGES'
Warning: unable to access index for repository http://www.stats.ox.ac.uk/pub/RWin/src/contrib:
cannot open URL 'http://www.stats.ox.ac.uk/pub/RWin/src/contrib/PACKAGES'
Warning: unable to access index for repository https://mran.microsoft.com/snapshot/2017-05-01/bin/windows/contrib/3.3:
cannot open URL 'https://mran.microsoft.com/snapshot/2017-05-01/bin/windows/contrib/3.3/PACKAGES'
Warning: unable to access index for repository http://www.stats.ox.ac.uk/pub/RWin/bin/windows/contrib/3.3:
cannot open URL 'http://www.stats.ox.ac.uk/pub/RWin/bin/windows/contrib/3.3/PACKAGES'
Warning message:
package 'AUC' is not available (for R version 3.3.3)
```

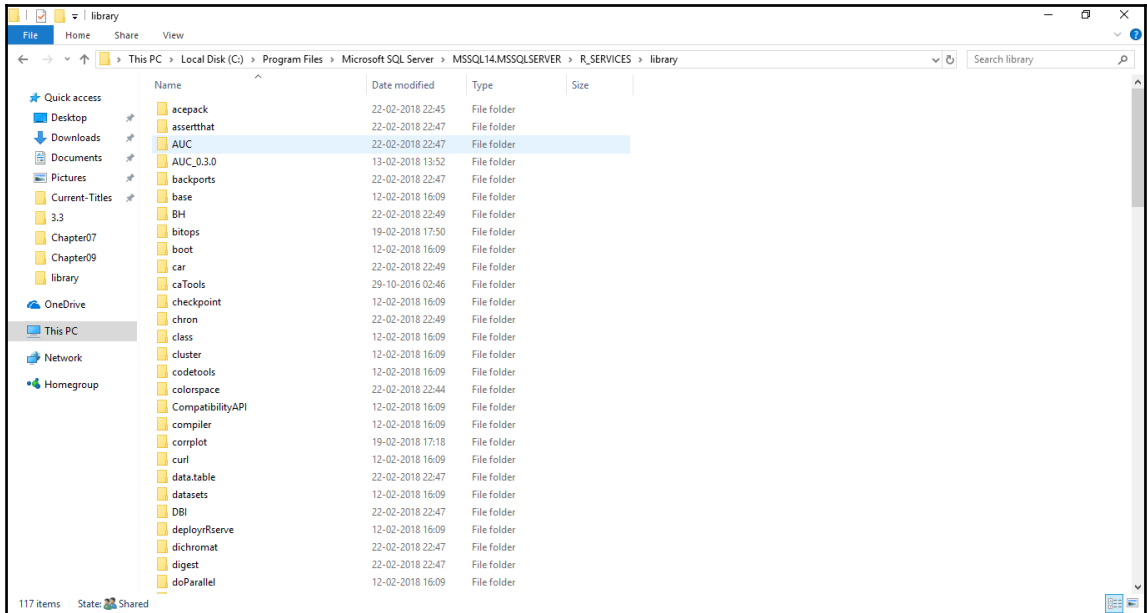
```
Msg 39004, Level 16, State 20, Line 9
A 'R' script error occurred during execution of 'sp_execute_external_script' with HRESULT 0x80004004.
Msg 39019, Level 16, State 2, Line 9
An external script error occurred:
Error in library(Hmisc) : there is no package called 'Hmisc'
Calls: source -> withVisible -> eval -> eval -> library

Error in execution. Check the output for more information.
Error in eval(expr, envir, enclos) :
Error in execution. Check the output for more information.
Calls: source -> withVisible -> eval -> eval -> .Call
Execution halted
```

Program Files > Microsoft > R Client > R_SERVER > library

Name	Date modified	Type	Size
base	24.08.2016 11:59	File folder	
boot	24.08.2016 11:59	File folder	
class	24.08.2016 11:59	File folder	
cluster	24.08.2016 11:59	File folder	
codetools	24.08.2016 11:59	File folder	
compiler	24.08.2016 11:59	File folder	
datasets	24.08.2016 11:59	File folder	
doParallel	24.08.2016 11:59	File folder	
doRSR	24.08.2016 11:59	File folder	
foreach	24.08.2016 11:59	File folder	
foreign	24.08.2016 11:59	File folder	
graphics	24.08.2016 11:59	File folder	
grDevices	24.08.2016 11:59	File folder	
grid	24.08.2016 11:59	File folder	
iterators	24.08.2016 11:59	File folder	
KernSmooth	24.08.2016 11:59	File folder	
lattice	24.08.2016 11:59	File folder	
MASS	24.08.2016 11:59	File folder	





ID	Package	LibPath	Version	Depends	Imports	Suggests	Built
1	acepack	C:\Program Files\Microsoft SQL Server\MSSQL13.MSS...	1.3.3.3	NULL	NULL	NULL	3.2.2
2	base	C:\Program Files\Microsoft SQL Server\MSSQL13.MSS...	3.2.2	NULL	NULL	NULL	3.2.2
3	boot	C:\Program Files\Microsoft SQL Server\MSSQL13.MSS...	1.3.17	R (>= 3.0.0); graphics; stats	NULL	MASS; survival	3.2.2
4	class	C:\Program Files\Microsoft SQL Server\MSSQL13.MSS...	7.3.13	R (>= 3.0.0); stats; utils	MASS	NULL	3.2.2
5	cluster	C:\Program Files\Microsoft SQL Server\MSSQL13.MSS...	2.0.3	R (>= 2.15.0); utils	graphics; gDevices; stats	MASS	3.2.2
6	codetools	C:\Program Files\Microsoft SQL Server\MSSQL13.MSS...	0.2.14	R (>= 2.1)	NULL	NULL	3.2.2
7	colorspace	C:\Program Files\Microsoft SQL Server\MSSQL13.MSS...	1.2.6	R (>= 2.13.0); methods	graphics	KernSmooth; MASS; karlins; mnorm; vof; dichrom...	3.2.2
8	compiler	C:\Program Files\Microsoft SQL Server\MSSQL13.MSS...	3.2.2	NULL	NULL	NULL	3.2.2
9	datasets	C:\Program Files\Microsoft SQL Server\MSSQL13.MSS...	3.2.2	NULL	NULL	NULL	3.2.2
10	dichromat	C:\Program Files\Microsoft SQL Server\MSSQL13.MSS...	2.0.0	R (>= 2.10); stats	NULL	NULL	3.2.2
11	digest	C:\Program Files\Microsoft SQL Server\MSSQL13.MSS...	0.6.8	R (>= 2.4.1)	NULL	NULL	3.2.2
12	doParallel	C:\Program Files\Microsoft SQL Server\MSSQL13.MSS...	1.0.10	R (>= 2.14.0); foreach(>= 1.2.0); iterators(>= 1...	NULL	carnt; nBench; optat	3.2.2
13	doRGR	C:\Program Files\Microsoft SQL Server\MSSQL13.MSS...	8.0.3	R (>= 2.6.0); foreach(>= 1.2.0); iterators(>= 1...	NULL	RUnit; doParallel	3.2.2
14	e1071	C:\Program Files\Microsoft SQL Server\MSSQL13.MSS...	1.6.7	NULL	graphics; gDevices; class; stats; methods; utils	cluster; nBench; rvet; randomForest; quart; SparseM...	3.2.2
15	foreach	C:\Program Files\Microsoft SQL Server\MSSQL13.MSS...	1.4.3	R (>= 2.5.0)	codetools; utils; iterators	NULL	3.2.2
16	foreign	C:\Program Files\Microsoft SQL Server\MSSQL13.MSS...	0.8.65	R (>= 3.0.0)	methods; utils; stats	NULL	3.2.2
17	Formula	C:\Program Files\Microsoft SQL Server\MSSQL13.MSS...	1.2.1	R (>= 2.0.0); stats	NULL	NULL	3.2.2
18	ggplot2	C:\Program Files\Microsoft SQL Server\MSSQL13.MSS...	1.0.1	R (>= 2.14); stats; methods	plyr (>= 1.7.5); digest; grid; gtable (>= 0.1.1); r...	quartz; Hmisc; mapproj; maps; hexbin; maptools; ...	3.2.2
19	graphics	C:\Program Files\Microsoft SQL Server\MSSQL13.MSS...	3.2.2	NULL	gDevices	NULL	3.2.2

SQLQuery1.sql - PPMUMCPU0185.WideWorldImporters (PPMUMCPU0185\admin (57))* - Microsoft SQL Server Management Studio (Administrator)

File Edit View Query Project Debug Tools Window Help

WideWorldImporters

Object Explorer

Connect - PPMUMCPU0185 (SQL Server 14.0.10)

Databases

- System Databases
 - master
 - model
 - msdb
 - tempdb
- Database Snapshots
- RevoTextDB
- SQLR
- WideWorldImporters
- Security
- Server Objects
- Replication
- PolyBase
- Always On High Availability
- Management
- Integration Services Catalogs
- SQL Server Agent
- XEvent Profiler

SQLQuery1.sql - P...PU0185\admin (57)*

```
SELECT * FROM Libraries;
GO
```

109 %

ID	Package	LibPath	Version	Depends	Imports
1	AUC_0.3.0	C:/Program Files/Microsoft SQL Server/MSSQL14.MSS...	0.3.0	NULL	NULL
2	base	C:/Program Files/Microsoft SQL Server/MSSQL14.MSS...	3.3.3	NULL	NULL
3	boot	C:/Program Files/Microsoft SQL Server/MSSQL14.MSS...	1.3-18	R [>= 3.0.0], graphics, stats	NULL
4	checkpoint	C:/Program Files/Microsoft SQL Server/MSSQL14.MSS...	0.4.0	R [>= 3.0.0]	utils
5	class	C:/Program Files/Microsoft SQL Server/MSSQL14.MSS...	7.3-14	R [>= 3.0.0], stats, utils	MASS
6	cluster	C:/Program Files/Microsoft SQL Server/MSSQL14.MSS...	2.0.5	R [>= 3.0.1]	graphics, grDevices, stats, util
7	codetools	C:/Program Files/Microsoft SQL Server/MSSQL14.MSS...	0.2-15	R [>= 2.1]	NULL
8	CompatibilityAPI	C:/Program Files/Microsoft SQL Server/MSSQL14.MSS...	1.1.0	R [>= 3.2.2]	jsonlite, methods, R6, utils
9	compiler	C:/Program Files/Microsoft SQL Server/MSSQL14.MSS...	3.3.3	NULL	NULL
10	curl	C:/Program Files/Microsoft SQL Server/MSSQL14.MSS...	2.6	R [>= 3.0.0]	NULL
11	datasets	C:/Program Files/Microsoft SQL Server/MSSQL14.MSS...	3.3.3	NULL	NULL
12	deployRserve	C:/Program Files/Microsoft SQL Server/MSSQL14.MSS...	9.0.0	R [>= 1.5.0]	NULL
13	doParallel	C:/Program Files/Microsoft SQL Server/MSSQL14.MSS...	1.0-10	R [>= 2.14.0], foreach [>= 1.2.0], iterators [>= 1...	NULL
14	doRSR	C:/Program Files/Microsoft SQL Server/MSSQL14.MSS...	10.0.0	R [>= 2.5.0], foreach [>= 1.2.0], iterators [>= 1...	NULL
15	foreach	C:/Program Files/Microsoft SQL Server/MSSQL14.MSS...	1.4.4	R [>= 2.5.0]	codetools, utils, iterators
16	foreign	C:/Program Files/Microsoft SQL Server/MSSQL14.MSS...	0.867	R [>= 3.0.0]	methods, utils, stats
17	graphics	C:/Program Files/Microsoft SQL Server/MSSQL14.MSS...	3.3.3	NULL	grDevices
18	grDevices	C:/Program Files/Microsoft SQL Server/MSSQL14.MSS...	3.3.3	NULL	NULL
19	grid	C:/Program Files/Microsoft SQL Server/MSSQL14.MSS...	3.3.3	NULL	grDevices, utils
20	iterators	C:/Program Files/Microsoft SQL Server/MSSQL14.MSS...	1.0.8	R [>= 2.5.0], utils	NULL
21	jsonlite	C:/Program Files/Microsoft SQL Server/MSSQL14.MSS...	1.4	methods	NULL
22	KernSmooth	C:/Program Files/Microsoft SQL Server/MSSQL14.MSS...	2.23-15	R [>= 2.5.0], stats	NULL
23	lattice	C:/Program Files/Microsoft SQL Server/MSSQL14.MSS...	0.20-34	R [>= 3.0.0]	grid, grDevices, graphics, sta
24	MASS	C:/Program Files/Microsoft SQL Server/MSSQL14.MSS...	7.3-45	R [>= 3.1.0], grDevices, graphics, stats, utils	methods

Query executed successfully. PPMUMCPU0185 (14.0 RTM) PPMUMCPU0185\admin (57) WideWorldImporters 00:00:00 57 rows

Output

Show output from: Object Explorer

```
ORDER BY
[Database_Name] ASC

drop table #tmp_db_hadr_dbns
```

Activate Windows
Go to Settings to activate Windows.

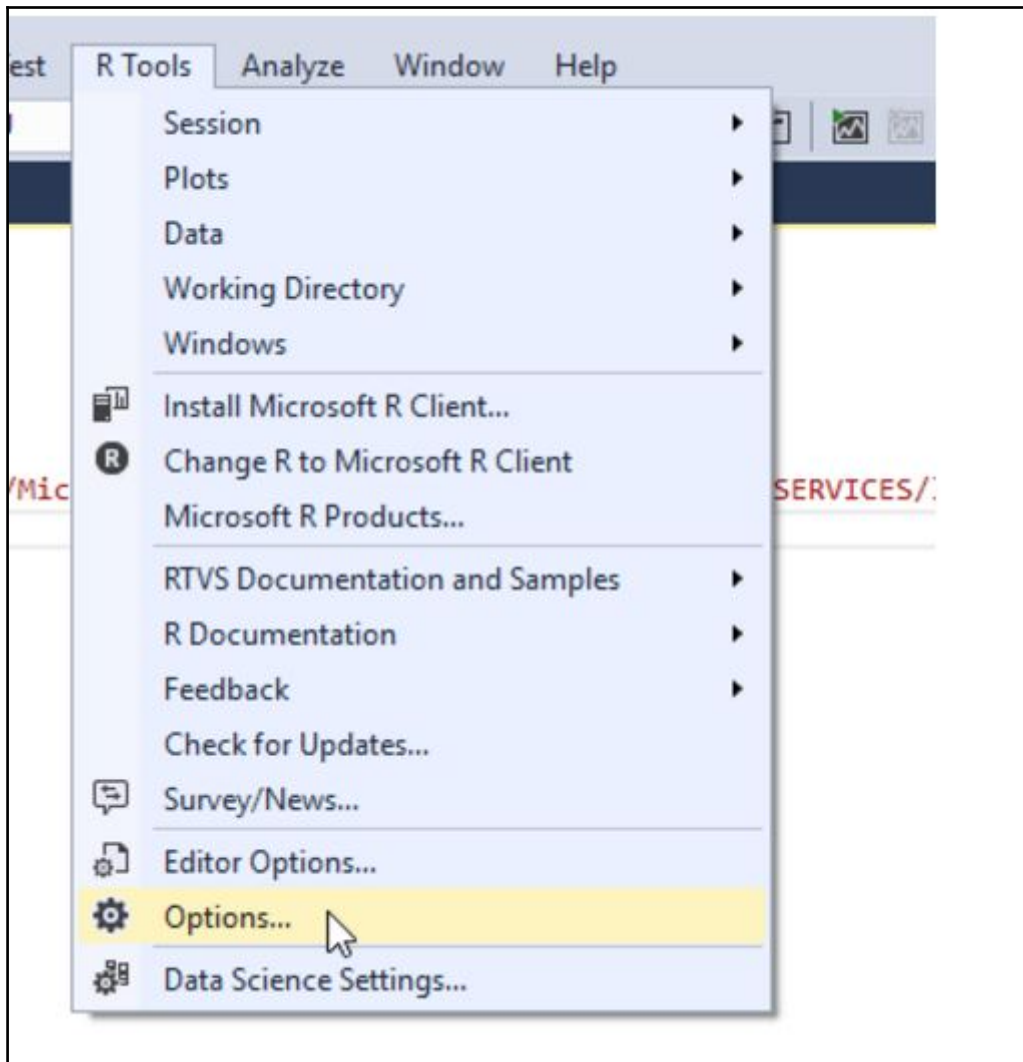
Ready Ln 2 Col 3 Ch 3 INS

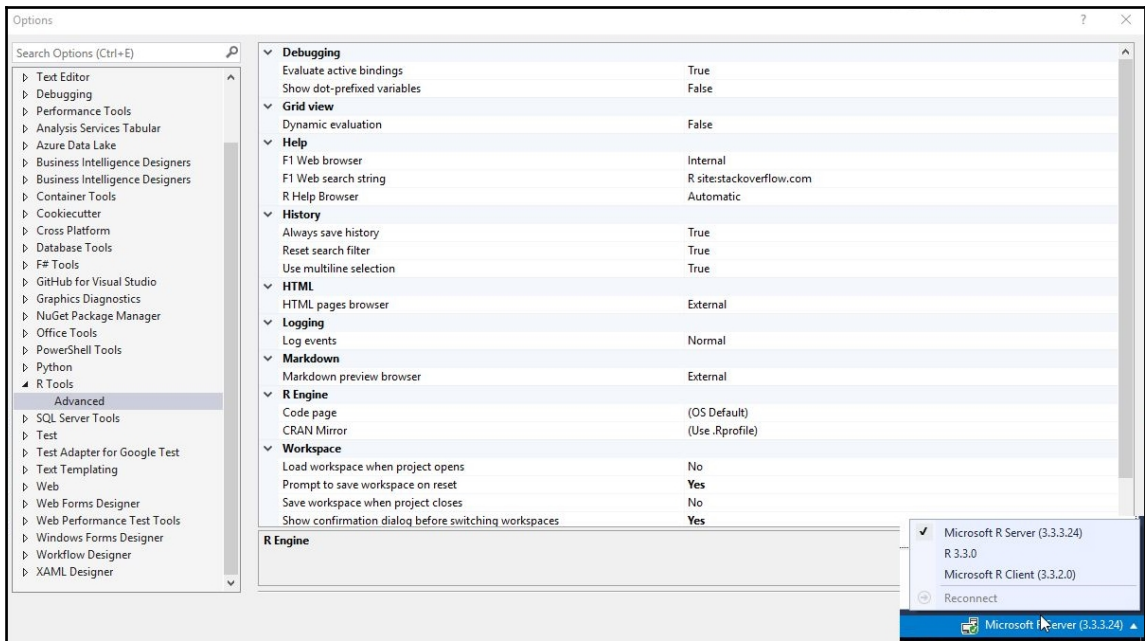
```
locale:
[1] LC_COLLATE=Slovenian_Slovenia.1250 LC_CTYPE=Slovenian_Slovenia.852 LC_MONETARY=Slovenian_Slovenia.1250 LC_NUMERIC=C
[5] LC_TIME=Slovenian_Slovenia.1250

attached base packages:
[1] stats graphics grDevices utils datasets methods base

other attached packages:
[1] RevoUtilsMath_8.0.3 RevoUtils_8.0.3 RevoMods_8.0.3 RevoScaler_8.0.3 lattice_0.20-33 rpart_4.1-10

loaded via a namespace (and not attached):
[1] tools_3.2.2 codetools_0.2-14 rtvs_1.0.0.0 grid_3.2.2 iterators_1.0.8 foreach_1.4.3
[1] "C:/Users/SI01817988/Documents/R/win-library/3.2" "C:/Program Files/Microsoft SQL Server/MSSQL13.MSSQLSERVER/R_SERVICES/library"
>
```





```
install.packages("AUC", dependencies = TRUE)
```

An external script error occurred:
Error in library("AUC") : there is no package called 'AUC'
Calls: source -> withVisible -> eval -> eval -> library

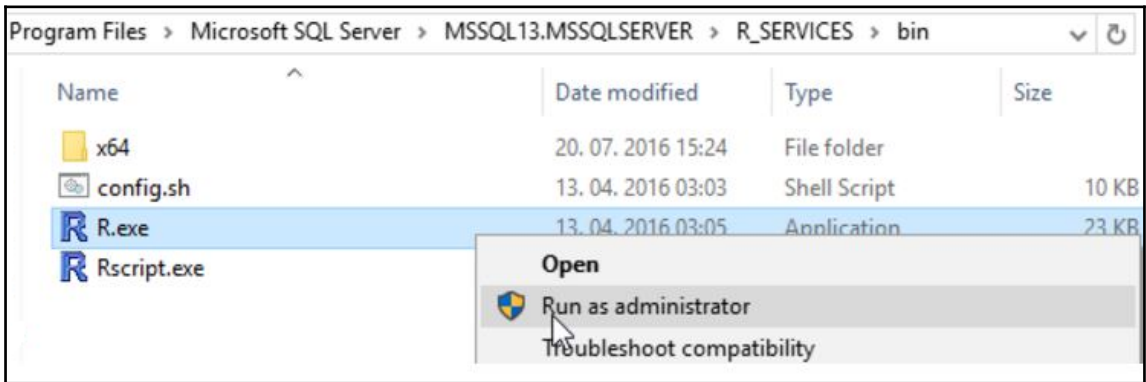
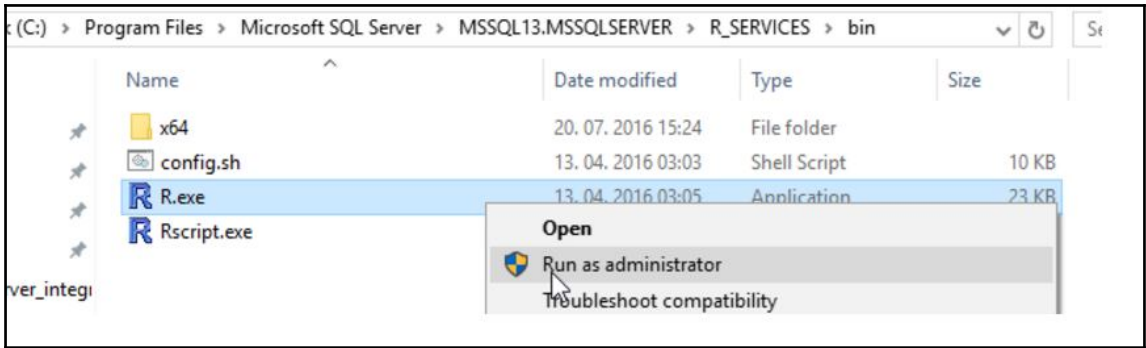
```
install.packages("AUC", dependencies = TRUE, lib = "C:/Program Files/Microsoft SQL Server/MSSQL13.MSSQLSERVER/R_SERVICES/library")
```

R Interactive
~/visual studio 2015/Projects/rproject2/rproject2

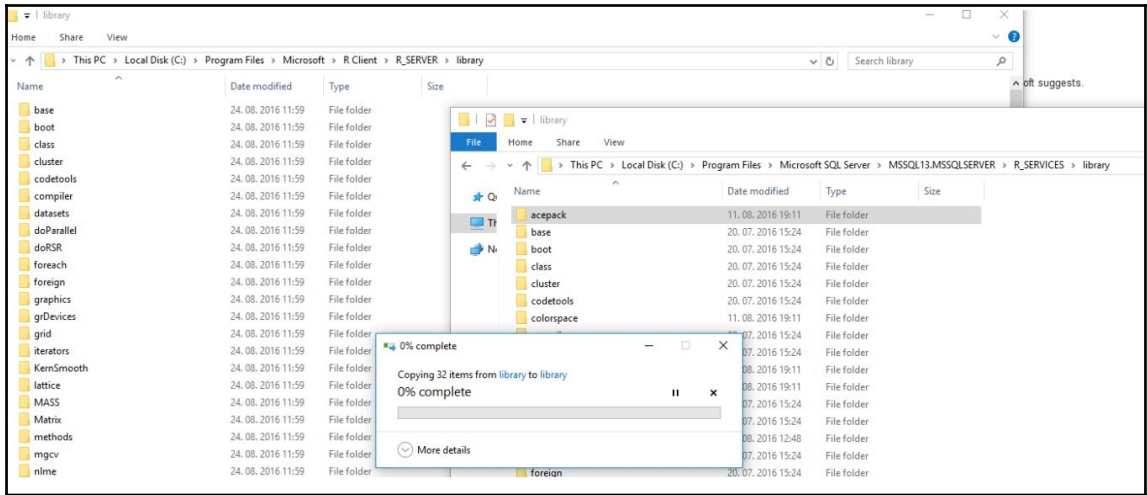
```
> install.packages("AUC", dependencies = TRUE, lib = "C:/Program Files/Microsoft SQL Server/MSSQL13.MSSQLSERVER/R_SERVICES/library")  
trying URL 'https://mran.revolutionanalytics.com/snapshot/2015-11-30/bin/windows/contrib/3.2/AUC_0.3.0.zip'  
Content type 'application/zip' length 44860 bytes (43 KB)  
downloaded 43 KB
```

package 'AUC' successfully unpacked and MD5 sums checked

The downloaded binary packages are in
C:\Users\SI01017988\AppData\Local\Temp\Rtmp6fdLWA\downloaded_packages



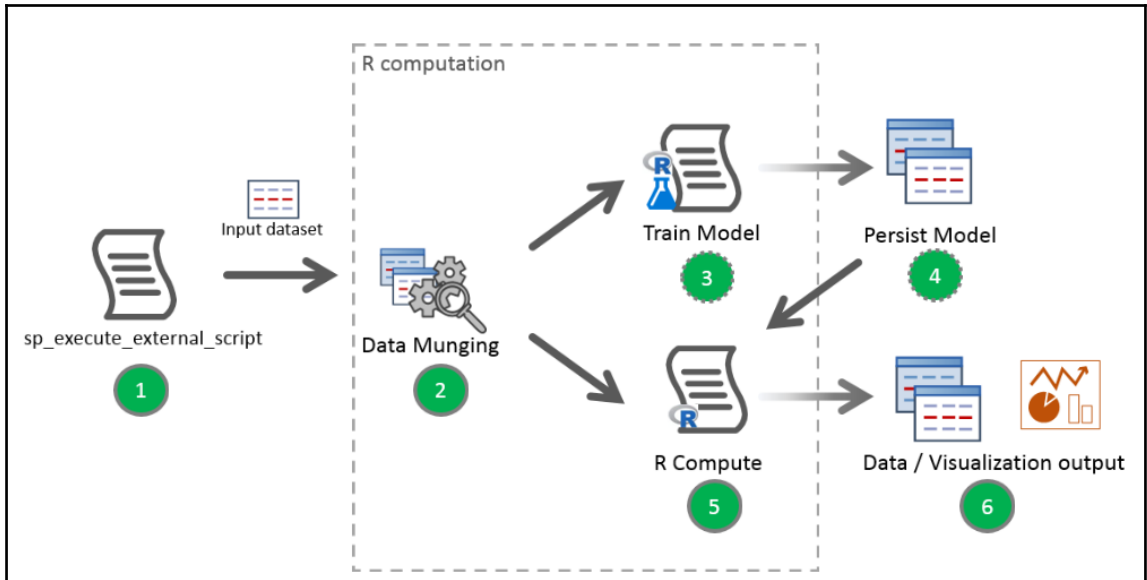
	Editor	Results	Messages
	output		
1	ARGUMENT 'cmd' __ignored__		
2	NULL		
3	NULL		
4	R version 3.2.2 (2015-08-14) -- "Fire Safety"		
5	Copyright (C) 2015 The R Foundation for Statistical Computing		
6	Platform: x86_64-w64-mingw32/x64 (64-bit)		
7	NULL		
8	R is free software and comes with ABSOLUTELY NO WARR...		
9	You are welcome to redistribute it under certain conditions.		
10	Type 'license()' or 'licence()' for distribution details.		
11	NULL		
12	R is a collaborative project with many contributors.		
13	Type 'contributors()' for more information and		
14	'citation()' on how to cite R or R packages in publications.		
15	NULL		
16	Type 'demo()' for some demos, 'help()' for on-line help, or		
17	'help.start()' for an HTML browser interface to help.		
18	Type 'q()' to quit R.		
19	NULL		
20	Microsoft R Server version 8.0 (64-bit):		
21	Microsoft packages Copyright (C) 2016 Microsoft Corporation		
22	NULL		
23	Type 'readme()' for release notes.		
24	NULL		
25	> install.packages("AUC")		
26	trying URL 'https://mran.revolutionanalytics.com/snapshot/20...		
27	Content type 'application/zip' length 44860 bytes (43 KB)		
28	=====		
29	downloaded 43 KB		
30	NULL		
31	package 'AUC' successfully unpacked and MD5 sums checked		
32	NULL		
33	The downloaded binary packages are in		
34	C:\Users\MSSQLSERVER\AppData\Local\Temp\Rtmp67K...		
35	>		
36	>		
37	NULL		



Chapter 4: Data Exploration and Data Visualization

```
> mtcars;
```

	mpg	cyl	disp	hp	drat	wt	qsec	vs	am	gear	carb
Mazda RX4	21.0	6	160.0	110	3.90	2.620	16.46	0	1	4	4
Mazda RX4 Wag	21.0	6	160.0	110	3.90	2.875	17.02	0	1	4	4
Datsun 710	22.8	4	108.0	93	3.85	2.320	18.61	1	1	4	1
Hornet 4 Drive	21.4	6	258.0	110	3.08	3.215	19.44	1	0	3	1
Hornet Sportabout	18.7	8	360.0	175	3.15	3.440	17.02	0	0	3	2
Valiant	18.1	6	225.0	105	2.76	3.460	20.22	1	0	3	1
Duster 360	14.3	8	360.0	245	3.21	3.570	15.84	0	0	3	4
Merc 240D	24.4	4	146.7	62	3.69	3.190	20.00	1	0	4	2
Merc 230	22.8	4	140.8	95	3.92	3.150	22.90	1	0	4	2
Merc 280	19.2	6	167.6	123	3.92	3.440	18.30	1	0	4	4
Merc 280C	17.8	6	167.6	123	3.92	3.440	18.90	1	0	4	4
Merc 450SE	16.4	8	275.8	180	3.07	4.070	17.40	0	0	3	3
Merc 450SL	17.3	8	275.8	180	3.07	3.730	17.60	0	0	3	3
Merc 450SLC	15.2	8	275.8	180	3.07	3.780	18.00	0	0	3	3
Cadillac Fleetwood	10.4	8	472.0	205	2.93	5.250	17.98	0	0	3	4
Lincoln Continental	10.4	8	460.0	215	3.00	5.424	17.82	0	0	3	4
Chrysler Imperial	14.7	8	440.0	230	3.23	5.345	17.42	0	0	3	4
Fiat 128	32.4	4	78.7	66	4.08	2.200	19.47	1	1	4	1
Honda Civic	30.4	4	75.7	52	4.93	1.615	18.52	1	1	4	2
Toyota Corolla	33.9	4	71.1	65	4.22	1.835	19.90	1	1	4	1
Toyota Corona	21.5	4	120.1	97	3.70	2.465	20.01	1	0	3	1
Dodge Challenger	15.5	8	318.0	150	2.76	3.520	16.87	0	0	3	2
AMC Javelin	15.2	8	304.0	150	3.15	3.435	17.30	0	0	3	2
Camaro Z28	13.3	8	350.0	245	3.73	3.840	15.41	0	0	3	4
Pontiac Firebird	19.2	8	400.0	175	3.08	3.845	17.05	0	0	3	2
Fiat X1-9	27.3	4	79.0	66	4.08	1.935	18.90	1	1	4	1
Porsche 914-2	26.0	4	120.3	91	4.43	2.140	16.70	0	1	5	2
Lotus Europa	30.4	4	95.1	113	3.77	1.513	16.90	1	1	5	2
Ford Pantera L	15.8	8	351.0	264	4.22	3.170	14.50	0	1	5	4
Ferrari Dino	19.7	6	145.0	175	3.62	2.770	15.50	0	1	5	6
Maserati Bora	15.0	8	301.0	335	3.54	3.570	14.60	0	1	5	8
Volvo 142E	21.4	4	121.0	109	4.11	2.780	18.60	1	1	4	2



Variable Explorer | R Package Manager | R Interactive - Micro...ft R Server (3.3.3.0) | R Help

Search

.GlobalEnv

Name	Value
connStr	"Driver=SQL Server;Server=MsSQLGir;Database=WideWorldImporters;trusted_connectio
dbHandle	Class 'RODBC' 3
order_query	"SELECT\n DATEFROMPARTS(YEAR(o.[OrderDate]), MONTH(o.[OrderDate]), 1) AS Orde
orders	108 obs. of 4 variables
@.Data	List of 4
@names	chr [1:4] "OrderMonth" "SalesPerson" "OrderCount" "TotalAmount"
@row.names	int [1:108] 1 2 3 4 5 6 7 8 9 10 ...
@.S3Class	"data.frame"
OrderMonth	Factor w/ 12 levels "2015-01-01","2015-02-01",...: 4 6 7 1 6 12 2 6 5 11 ...
SalesPerson	Factor w/ 9 levels "Amy","Anthony",...: 3 5 1 6 2 2 3 4 3 3 ...
OrderCount	int [1:108] 221 206 242 187 182 171 188 387 199 176 ...
TotalAmount	num [1:108] 545951 502829 541685 490049 392589 ...

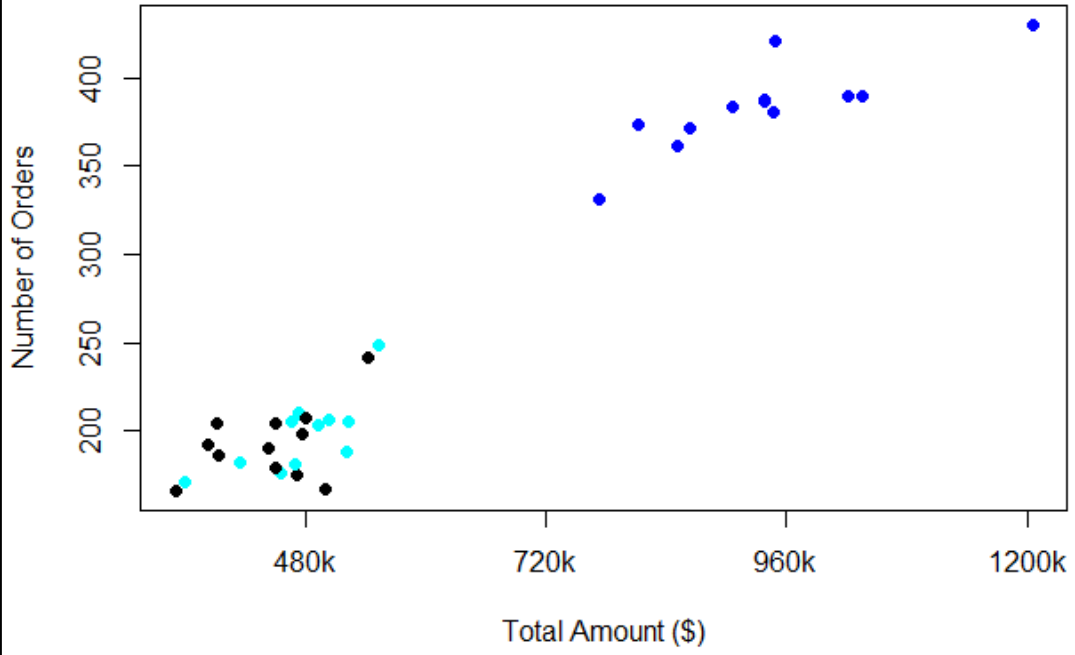
Notifications | Solution Explorer | R Plot History | Workspaces

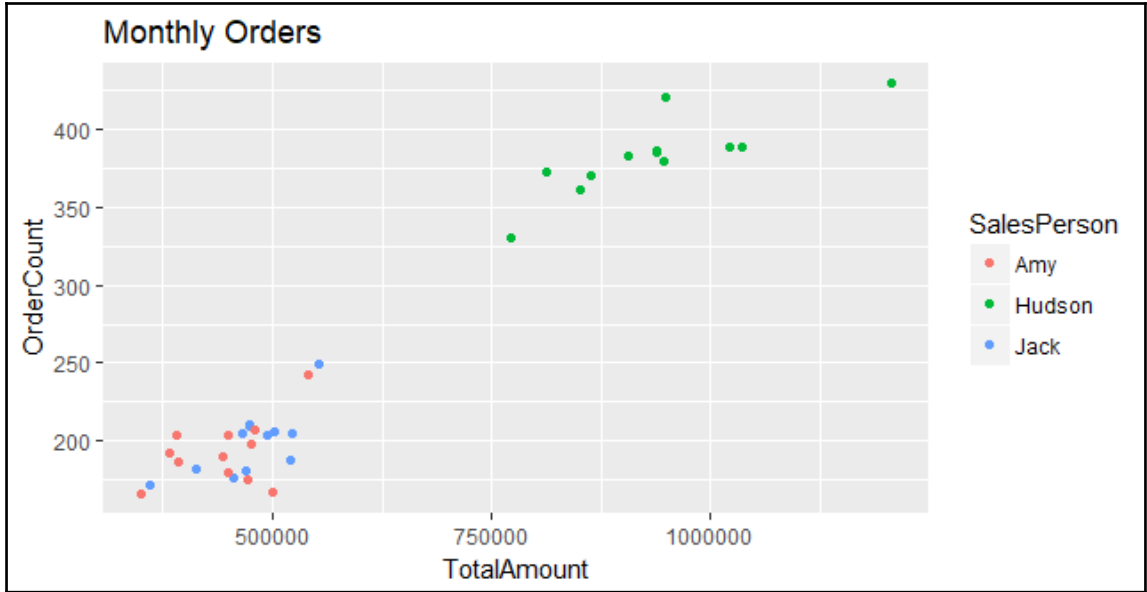


	OrderMonth	SalesPerson	OrderCount	TotalAmount
1	2015-04-01	Archer	221	545951.4
2	2015-06-01	Jack	206	502828.7
3	2015-07-01	Amy	242	541684.9
4	2015-01-01	Kayla	187	490048.7
5	2015-06-01	Anthony	182	392589.0
6	2015-12-01	Anthony	171	465972.5
7	2015-02-01	Archer	188	468532.7
8	2015-06-01	Hudson	387	937499.2
9	2015-05-01	Archer	199	474265.2
10	2015-11-01	Archer	176	365369.0
11	2015-01-01	Archer	191	528583.9
12	2015-11-01	Lily	181	441327.1
13	2015-12-01	Sophia	196	462205.7
14	2015-06-01	Sophia	200	487512.8
15	2015-06-01	Taj	170	410525.0
16	2015-02-01	Hudson	371	863785.6
17	2015-05-01	Jack	203	493282.0
18	2015-08-01	Kayla	150	399226.8
19	2015-09-01	Anthony	198	492197.7
20	2015-10-01	Sophia	220	501958.7

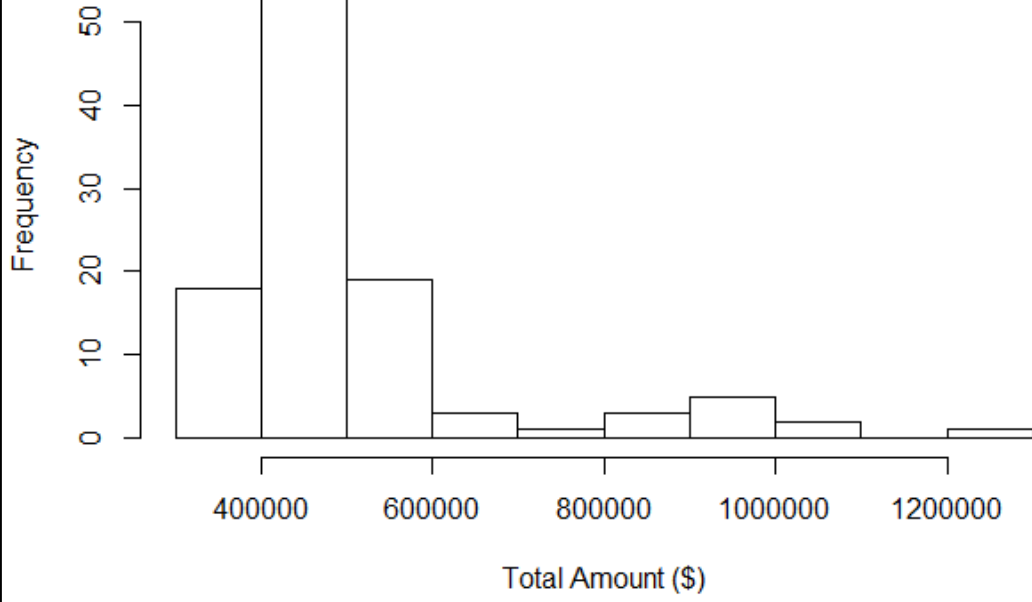
```
> str(orders)
'data.frame':  108 obs. of  4 variables:
 $ OrderMonth : Factor w/ 12 levels "2015-01-01","2015-02-01",...: 4 6 7 1 6 12 2 6 5 11 ...
 $ SalesPerson: Factor w/ 9 levels "Amy","Anthony",...: 3 5 1 6 2 2 3 4 3 3 ...
 $ OrderCount : int  221 206 242 187 182 171 188 387 199 176 ...
 $ TotalAmount: num  545951 502829 541685 490049 392589 ...
```

Monthly Orders

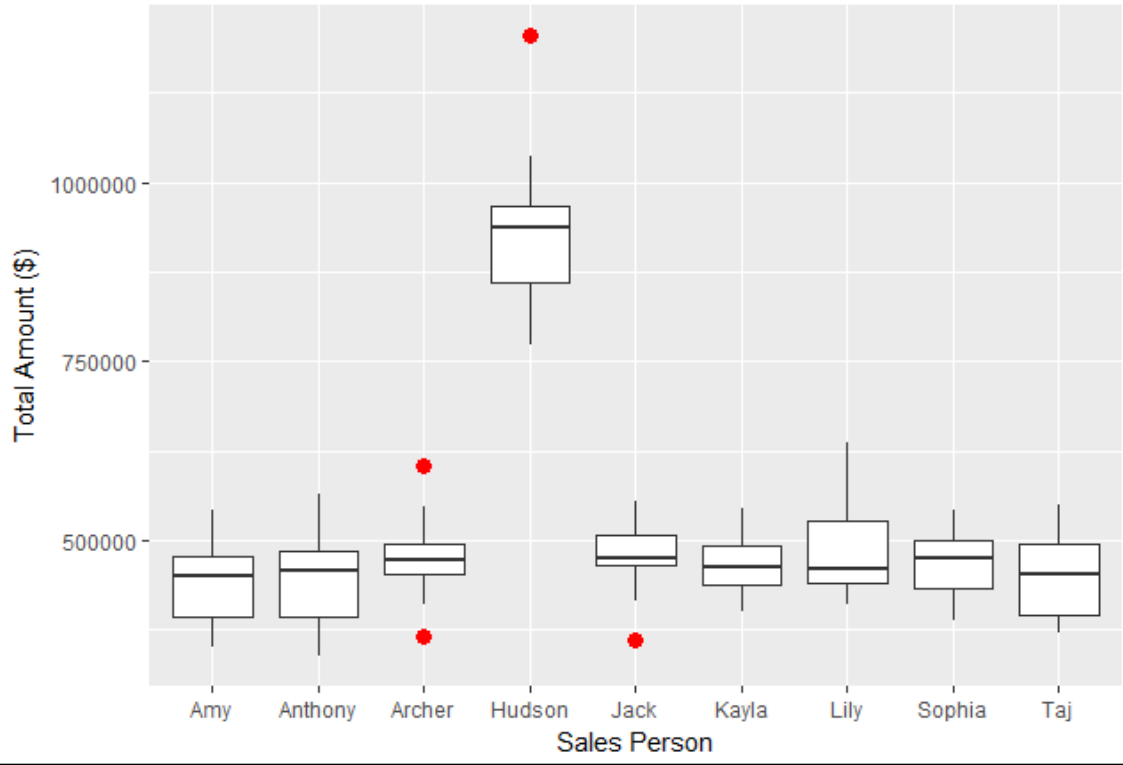


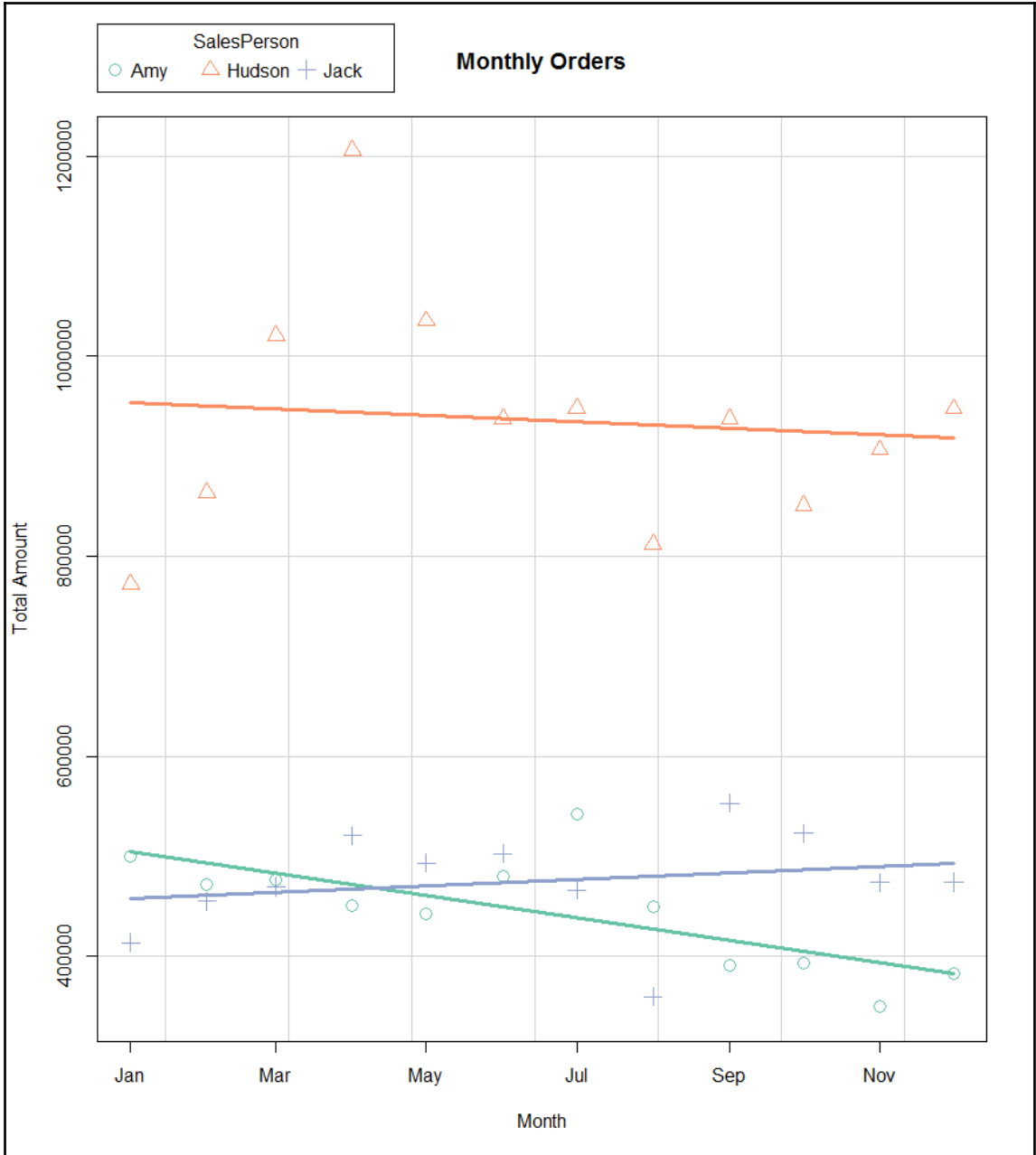


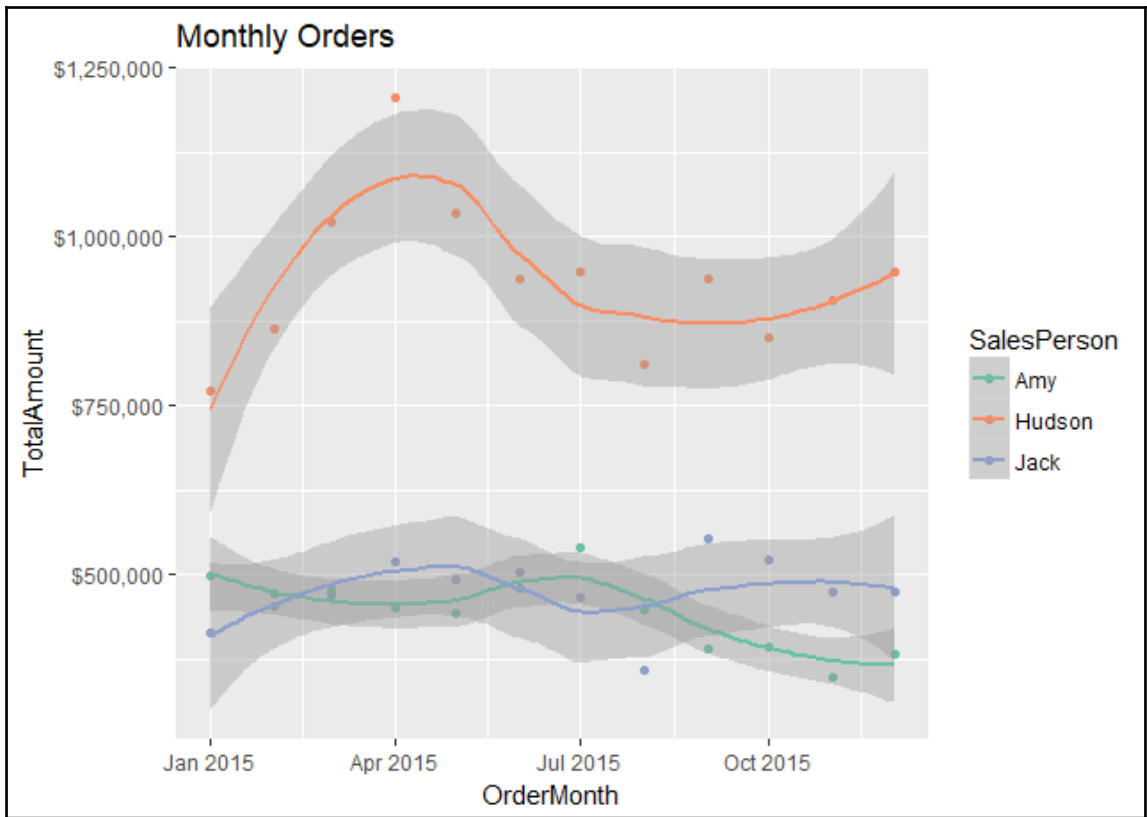
Monthly Orders

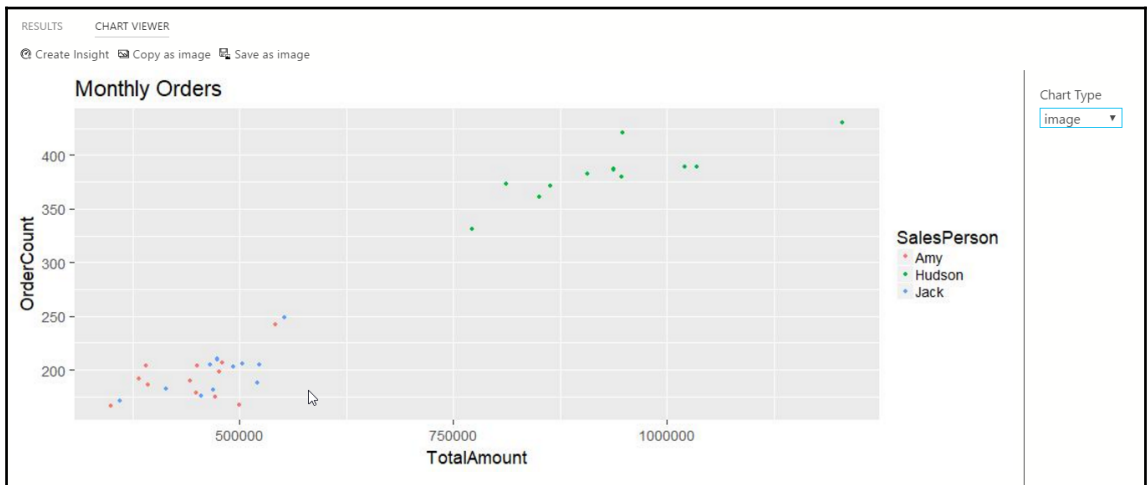
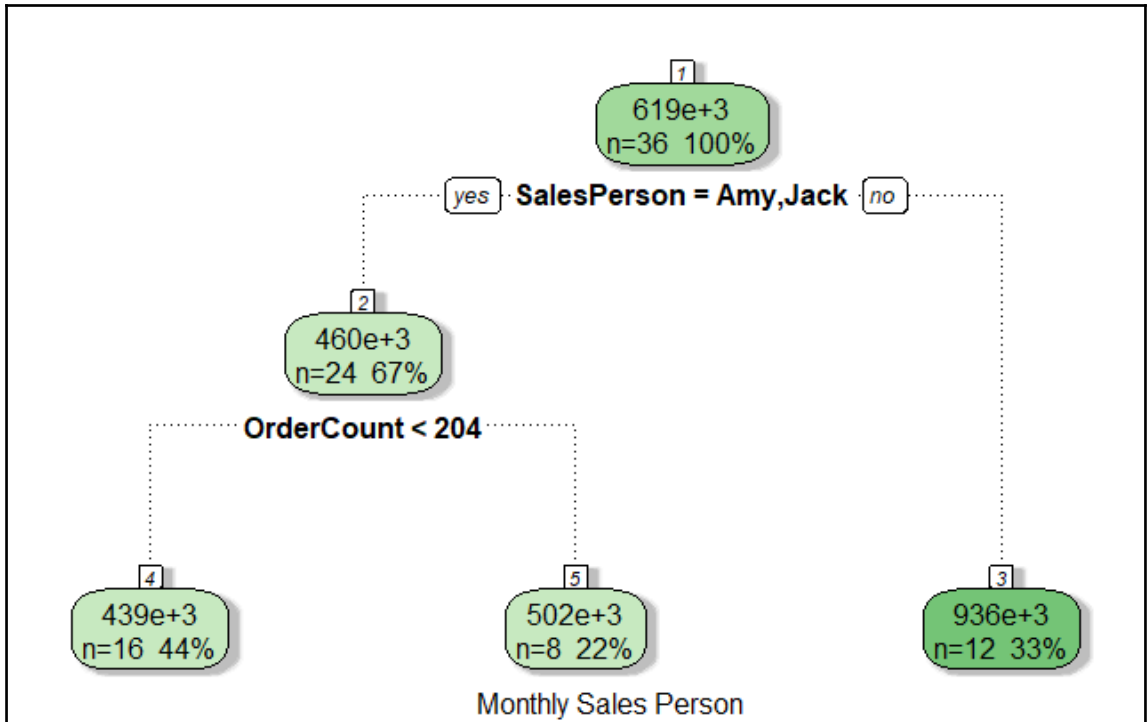


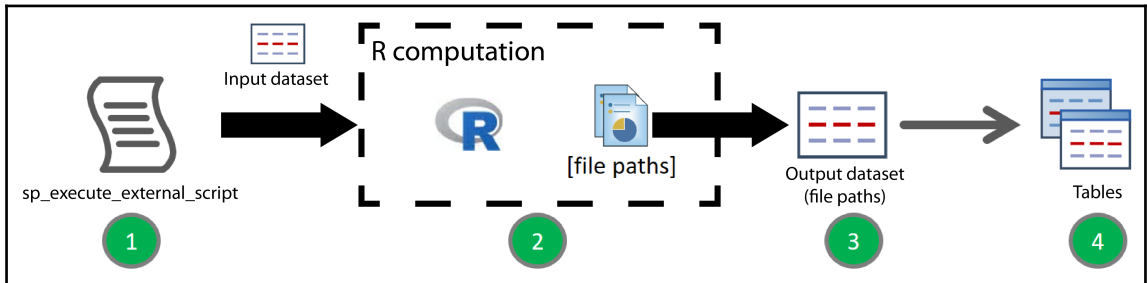
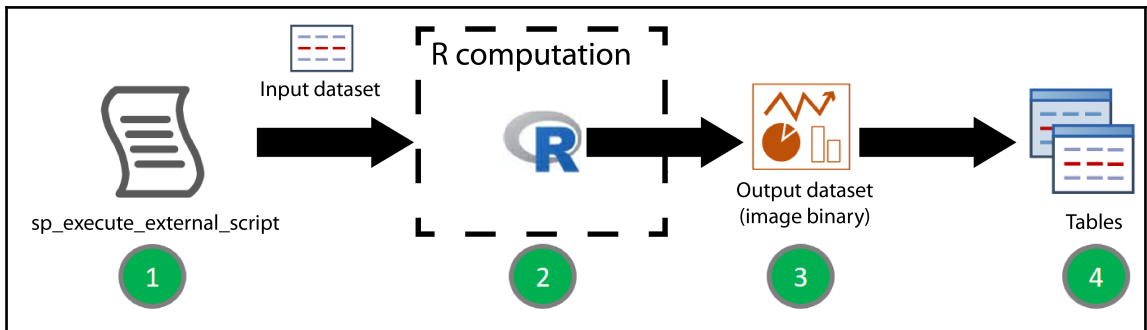
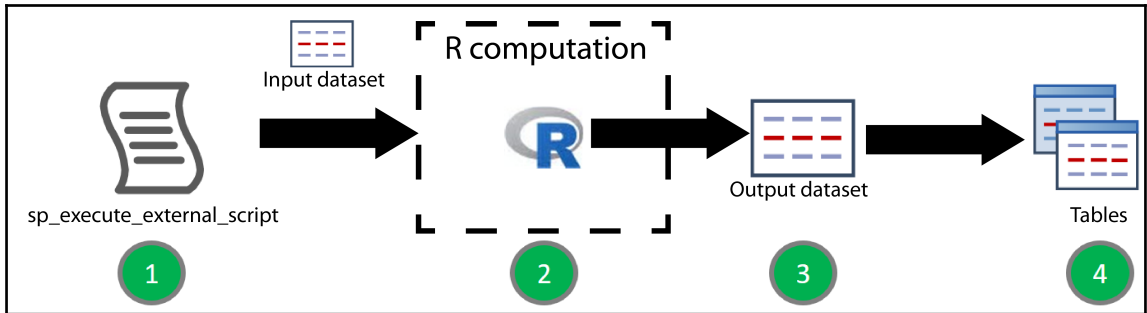
Monthly Orders











Dataset Properties



Query

Fields

Options

Filters

Parameters

Choose a data source and create a query.

Name:

AOV_SalesPerson

- Use a shared dataset.
 Use a dataset embedded in my report.

Data source:

WideWorldImporters

New...

Query type:

- Text Table Stored Procedure

Query:

EXEC dbo.usp_AnalyzeOrdersUsingAnova



Query Designer...

Import...

Refresh Fields

Time out (in seconds):

0

Help

OK

Cancel

Analysis of Variance on Monthly Orders

Attribute	DF	Sum Sq	Mean Sq	FValue	Pr(<F)
[Attribute]	[Sum(DF)]	[Sum(SumSq)]	[Sum(MeanSq)]	[Sum(FValue)]	[Sum(Pr_F)]
«Expr»					
[&ExecutionTime]					

SQL+R_Chapter04_SRS_Anova_01.rdl - Microsoft SQL Server Report Builder

Run [R]

Design Zoom First Previous of 1 Next Last Refresh Stop Back Print Page Setup Print Layout Export Document Map Parameters Find

Analysis of Variance on Monthly Orders

Attribute	DF	Sum Sq	Mean Sq	FValue	Pr(<F)
SalesPerson	8.00	2,401,728,729,458.63	300,216,091,182.33	66.47	2.1435020433749E-36
Residuals	99.00	447,164,515,729.08	4,516,813,290.19		

Since the p-value of 2.1435020433749E-36 is less than the .05 significance level, we reject the null hypothesis that the mean of monthly Total Amount of SalesPerson are all equal. This means that there is dependency between SalesPerson and Monthly Orders Total Amount

7/15/2017 11:45:39 AM

No current report server. 100%

Dataset Properties



Query

Fields

Options

Choose a data source and create a query.

Name:

MonthlyPlot

- Use a shared dataset.
 Use a dataset embedded in my report.

Data source:

WideWorldImporters

New...

Query type:

- Text Table Stored Procedure

Query:

EXEC dbo.usp_CreateMonthlySalesPlot



Query Designer...

Import...

Refresh Fields

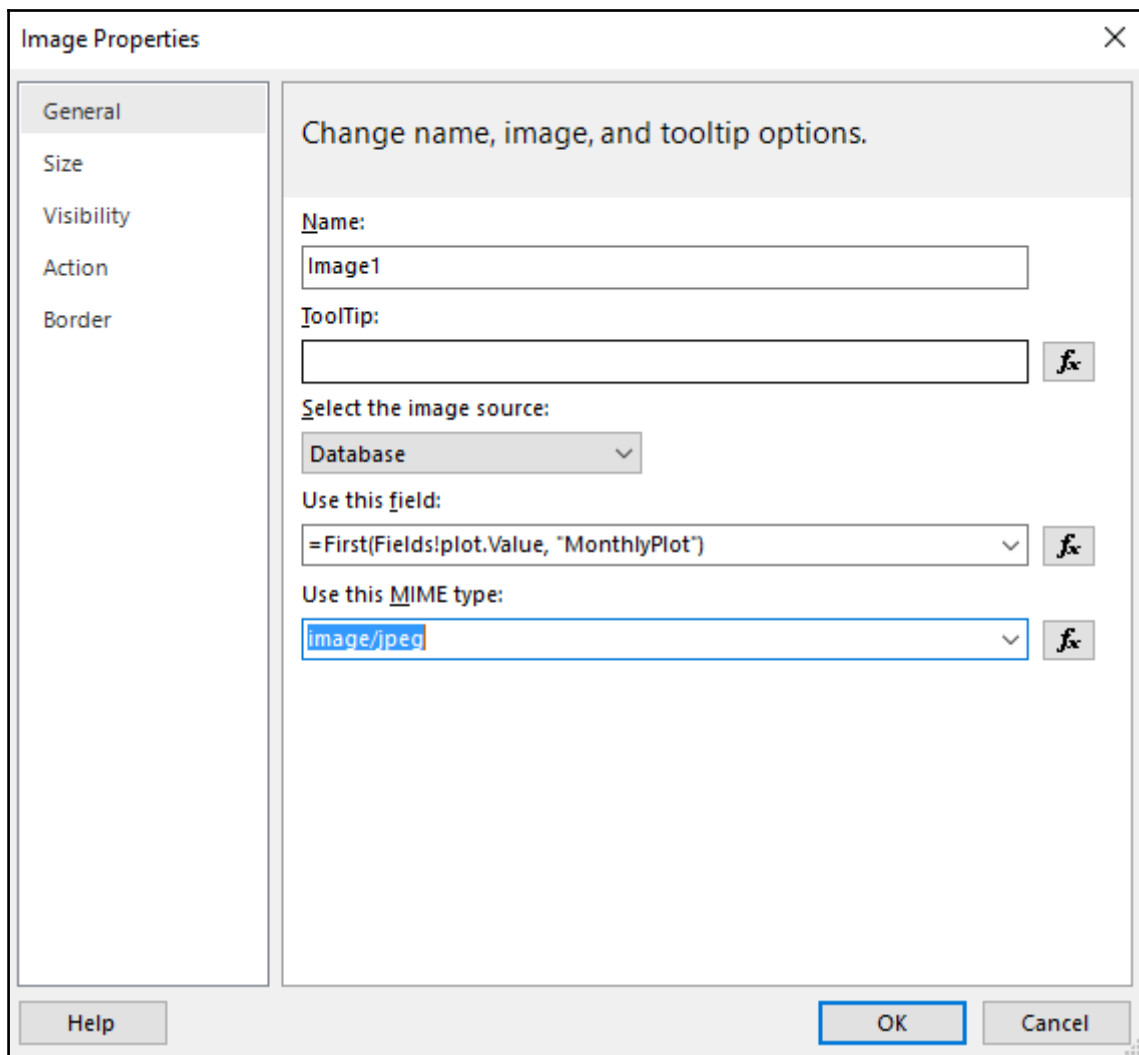
Time out (in seconds):

0

Help

OK

Cancel



File Run

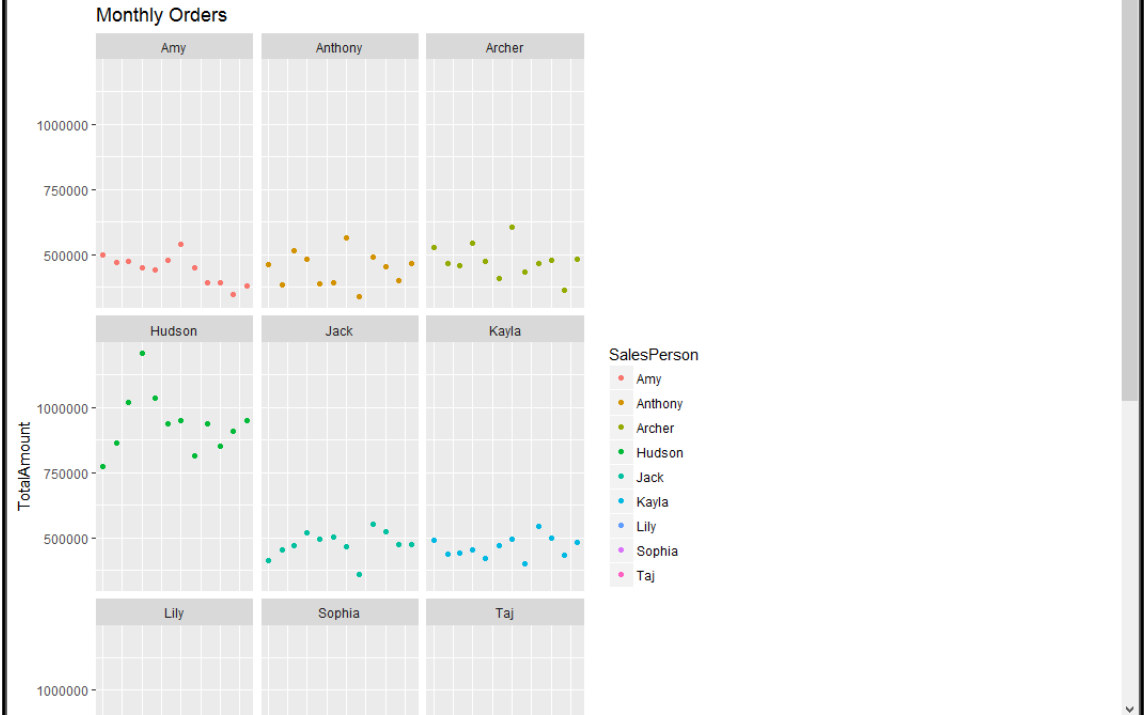
Design Zoom First Previous of 1 Next Last Refresh Stop Back

Print Page Setup Print Layout Export Document Map Parameters Options Find

Analysis of Variance on Monthly Orders

Attribute	DF	Sum Sq	Mean Sq	FValue	Pr(<F)
SalesPerson	8.00	2,401,728,729,458.63	300,216,091,182.33	66.47	2.1435020433749E-36
Residuals	99.00	447,164,515,729.08	4,516,813,290.19		

Since the p-value of 2.1435020433749E-36 is less than the .05 significance level, we reject the null hypothesis that the mean of monthly Total Amount of SalesPerson are all equal. This means that there is dependency between SalesPerson and Monthly Orders Total Amount



SQL - R - Power BI Desktop

Visualizations

Fields

Visualizations

Fields

Monthly Orders

Year

2013

2014

2015

2016

SalesPerson

Amy

Anthony

Achur

Hudson

Jack

Kayle

Lily

Sophia

Taj

TotalAmount

OrderMonth

R script editor

Duplicate rows were removed from the data.

```

# Create dataframe
dataset <- data.frame(OrderMonth, SalesPerson, TotalAmount)

# Remove duplicated rows
dataset <- unique(dataset)
dataset$OrderMonth <- as.Date(dataset$OrderMonth)

library(ggplot2)
a <- qplot(y = TotalAmount, x = OrderMonth, data = dataset,
  color = SalesPerson, facets = ~SalesPerson,
  main = "Monthly Orders",
  a = scale_x_date(date_labels = "%b"),
  a = scale_y_continuous(label = scales::dollar))

```

Visual level filters

OrderMonth(All)

SalesPerson(All)

TotalAmount(All)

Page level filters

Drag data fields here

Report level filters

Drag data fields here

PAGE 1 OF 1

UPDATE AVAILABLE (CLICK TO DOWNLOAD)

SQL Server database

Server ⓘ

Database

Data Connectivity mode ⓘ

- Import
 DirectQuery

⌵ Advanced options

Command timeout in minutes (optional)

SQL statement (optional, requires database)

```
SELECT
    DATEFROMPARTS(YEAR(o.[OrderDate]), MONTH(o.[OrderDate]), 1) AS OrderMonth,
    sp.[PreferredName] AS SalesPerson,
    COUNT(DISTINCT o.[OrderID]) AS OrderCount,
    SUM(o1.[Quantity] * o1.[UnitPrice]) AS TotalAmount
FROM [Sales].[Orders] o
    INNER JOIN [Sales].[OrderLines] ol
        ON ol.[OrderID] = o.[OrderID]
    INNER JOIN [Application].[People] sp
        ON sp.[PersonID] = o.[SalespersonPersonID]
WHERE sp.[ValidTo] >= GETDATE()
GROUP BY
    DATEFROMPARTS(YEAR(o.[OrderDate]), MONTH(o.[OrderDate]), 1),
```

- Include relationship columns
 Navigate using full hierarchy
 Enable SQL Server Failover support

OK

Cancel

Local SQL database: WideWorldImporters

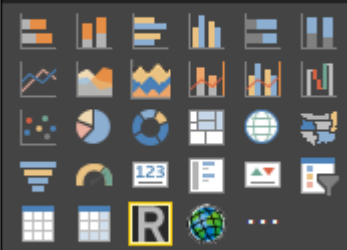
OrderMonth	SalesPerson	OrderCount	TotalAmount
3/1/2013 12:00:00 AM	Archer	187	440788.35
7/1/2014 12:00:00 AM	Jack	185	512500.75
8/1/2013 12:00:00 AM	Jack	145	337814.4
2/1/2014 12:00:00 AM	Hudson	309	619766.6
6/1/2015 12:00:00 AM	Jack	206	502828.7
2/1/2016 12:00:00 AM	Jack	174	389548.1
1/1/2013 12:00:00 AM	Anthony	174	373630.2
1/1/2013 12:00:00 AM	Taj	172	345670.9
6/1/2013 12:00:00 AM	Amy	182	442164
6/1/2014 12:00:00 AM	Amy	192	444294.3
1/1/2015 12:00:00 AM	Kayla	187	490048.7
6/1/2015 12:00:00 AM	Anthony	182	392588.95

Load

Edit

Cancel

Visualizations >



Fields >

Search

MonthlyOrders

- Σ OrderCount
- OrderMonth
- SalesPerson
- Σ TotalAmount

Values

- OrderMonth
- Year
- Quarter
- Month
- Day
- SalesPerson
- TotalAmount

The image shows a dark-themed user interface for a data visualization tool. On the left, there are three sections: 'Values' containing 'OrderMonth', 'SalesPerson', and 'TotalAmount'; 'Filters' containing 'OrderMonth(All)', 'SalesPerson(All)', and 'TotalAmount(All)'; and 'Page level filters'. A context menu is open over the 'OrderMonth' field in the 'Values' section. The menu items are: 'Remove field', 'Rename', 'Don't summarize' (with a green checkmark), 'Earliest', 'Latest', 'Count (Distinct)', 'Count', 'Show items with no data', 'OrderMonth' (with a green checkmark and highlighted), 'Date Hierarchy', and 'New Group'.

Values

- OrderMonth
- SalesPerson
- TotalAmount

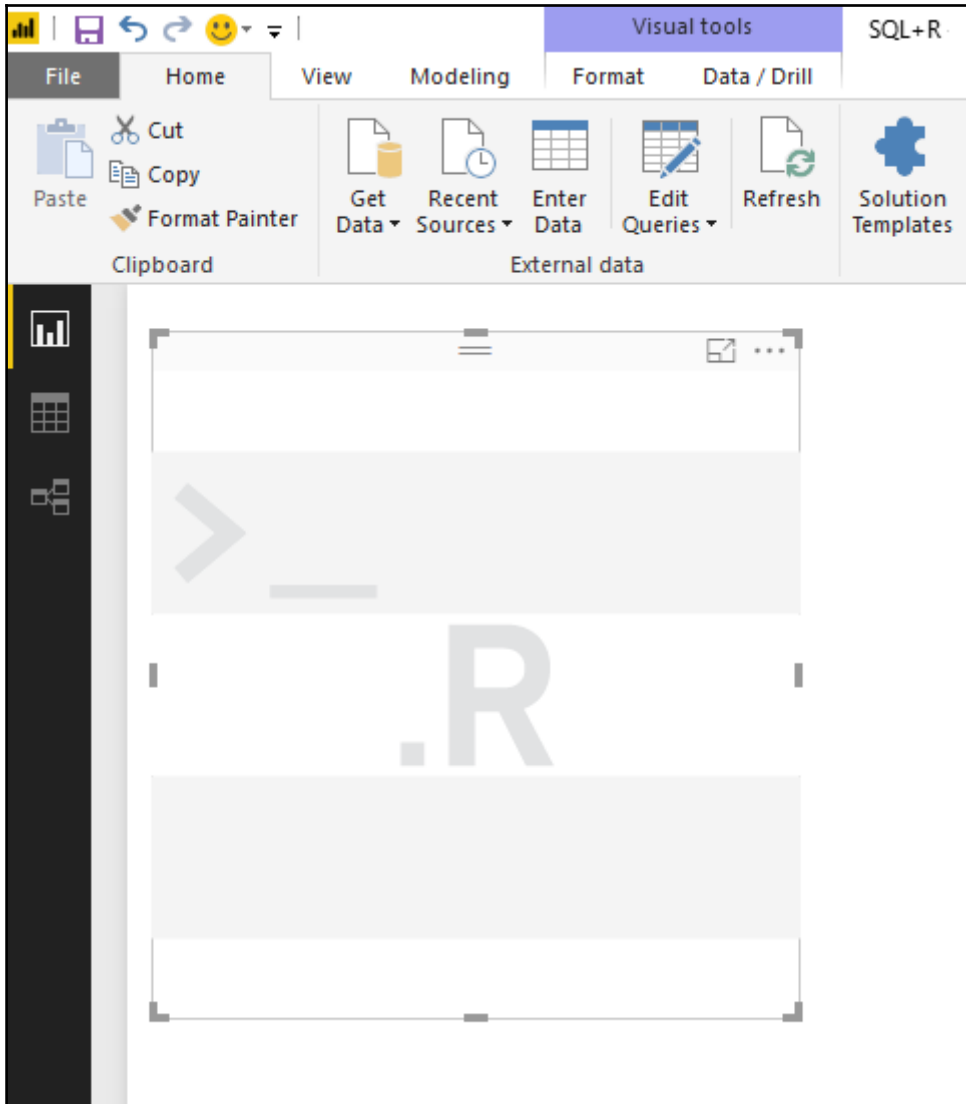
Filters

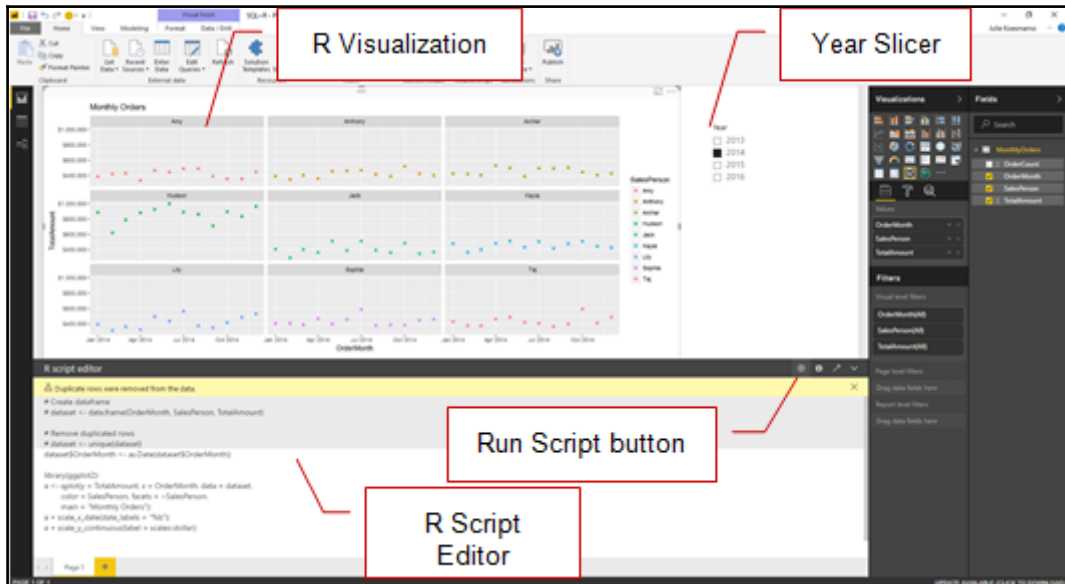
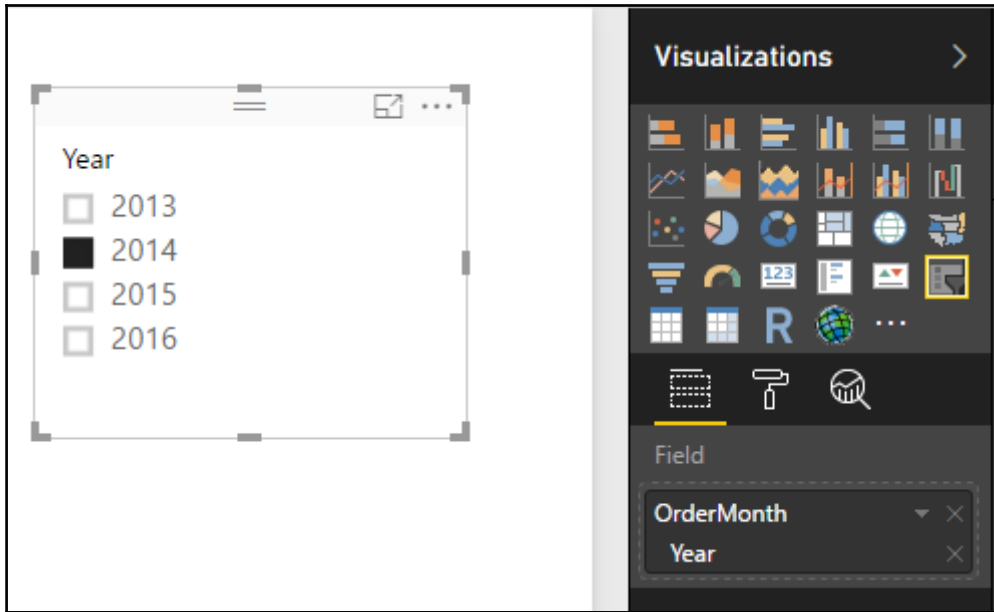
Visual level filters

- OrderMonth(All)
- SalesPerson(All)
- TotalAmount(All)


Page level filters

- Remove field
- Rename
- ✓ Don't summarize
- Earliest
- Latest
- Count (Distinct)
- Count
- Show items with no data
- ✓ OrderMonth
- Date Hierarchy
- New Group





Chapter 5: RevoScaleR Package

<p>Data Preparation</p> <ul style="list-style-type: none"> Data import – Delimited, Fixed, SAS, SPSS, ODBC Variable creation & transformation Recode variables Factor variables Missing value handling Sort, Merge, Split Aggregate by category (means, sums) <p>Descriptive Statistics</p> <ul style="list-style-type: none"> Min / Max, Mean, Median (approx.) Quantiles (approx.) Standard Deviation Variance Correlation Covariance Sum of Squares (cross product matrix for set variables) Pairwise Cross tabs Risk Ratio & Odds Ratio Cross-Tabulation of Data (standard tables & long form) Marginal Summaries of Cross Tabulations 	<p>Statistical Tests</p> <ul style="list-style-type: none"> Chi Square Test Kendall Rank Correlation Fisher's Exact Test Student's t-Test <p>Sampling</p> <ul style="list-style-type: none"> Subsample (observations & variables) Random Sampling <p>Predictive Models</p> <ul style="list-style-type: none"> Sum of Squares (cross product matrix for set variables) Multiple Linear Regression Generalized Linear Models (GLM) exponential family distributions: binomial, Gaussian, inverse Gaussian, Poisson, Tweedie. Standard link functions: cauchit, identity, log, logit, probit. User defined distributions & link functions. Covariance & Correlation Matrices Logistic Regression Classification & Regression Trees Predictions/scoring for models Residuals for all models 	<p>Variable Selection</p> <ul style="list-style-type: none"> Stepwise Regression <p>Simulation</p> <ul style="list-style-type: none"> Simulation (e.g. Monte Carlo) Parallel Random Number Generation <p>Cluster Analysis</p> <ul style="list-style-type: none"> K-Means <p>Classification</p> <ul style="list-style-type: none"> Decision Trees Decision Forests Gradient Boosted Decision Trees Naive Bayes <p> Combination</p> <ul style="list-style-type: none"> rxDataStep rxExec PEMA-R API Custom Algorithms
--	--	---

```
DATA work.SAS_data;
INPUT income gender count;
DATALINES;
  1 1 25
  1 2 35
  2 1 30
  2 2 10
;

PROC PRINT DATA=work.SAS_data;
RUN;
```

	income	gender	count
1	1	1	25
2	1	2	35
3	2	1	30
4	2	2	10

DATA LIST LIST /income gender count.

Begin data

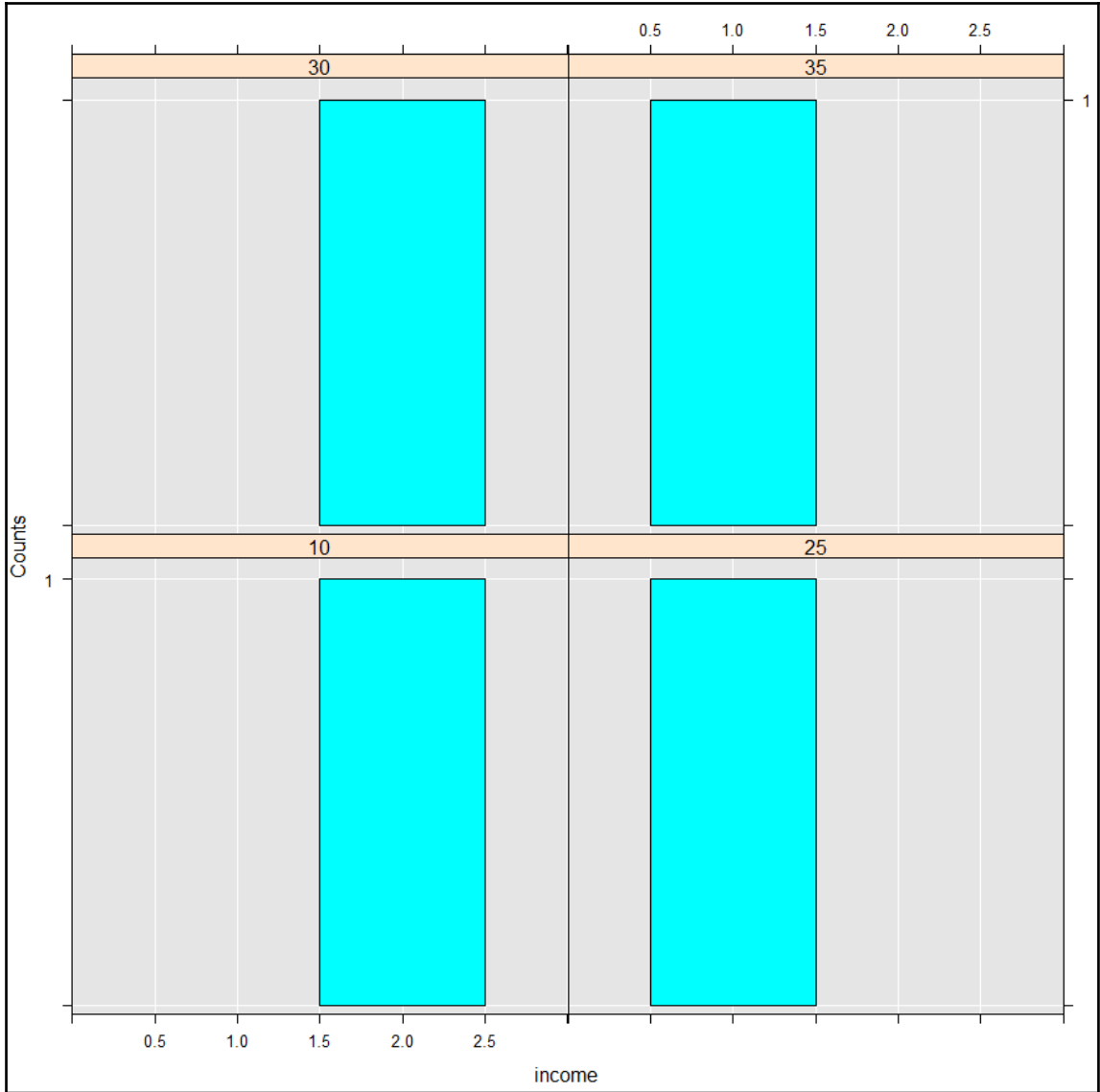
1, 1, 25

1, 2, 35

2, 1, 30

2, 2, 10

END DATA.



Editor		Results		Messages	
(No column name)					
1	C:/Program Files/Microsoft SQL Server/MSSQL13.MSSQLSERVER/R_SERVICES/library/RevoScaleR/SampleData				

```

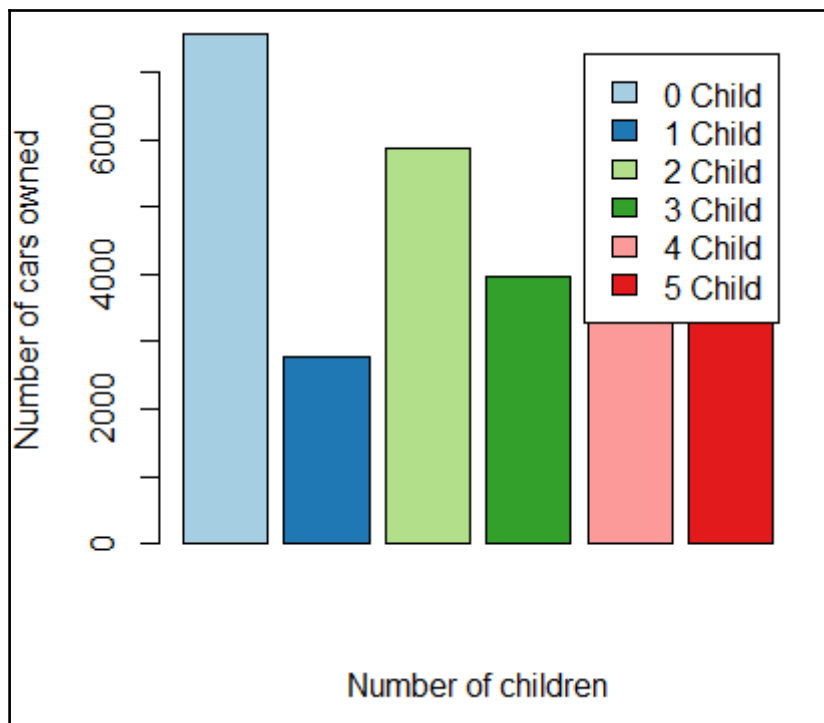
get_Info | List of 6
objName : chr "df_sql"
description: NULL
class : chr "data.frame"
numRows : int 701
numVars : int 3
numBlocks : num 0
attr(*, "class")= chr "rxGetInfo"

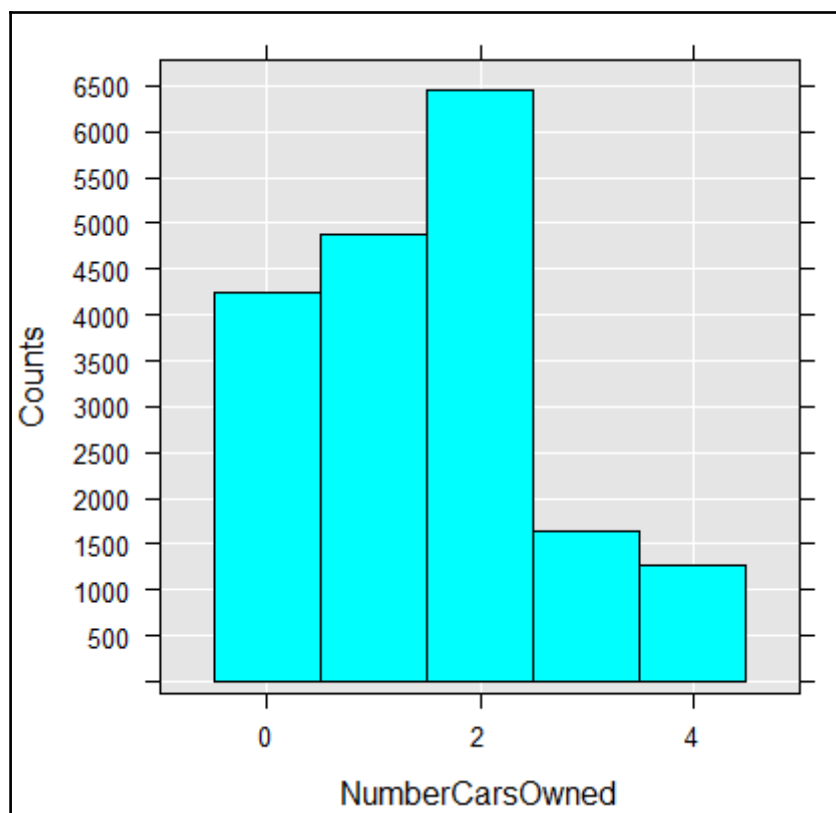
```

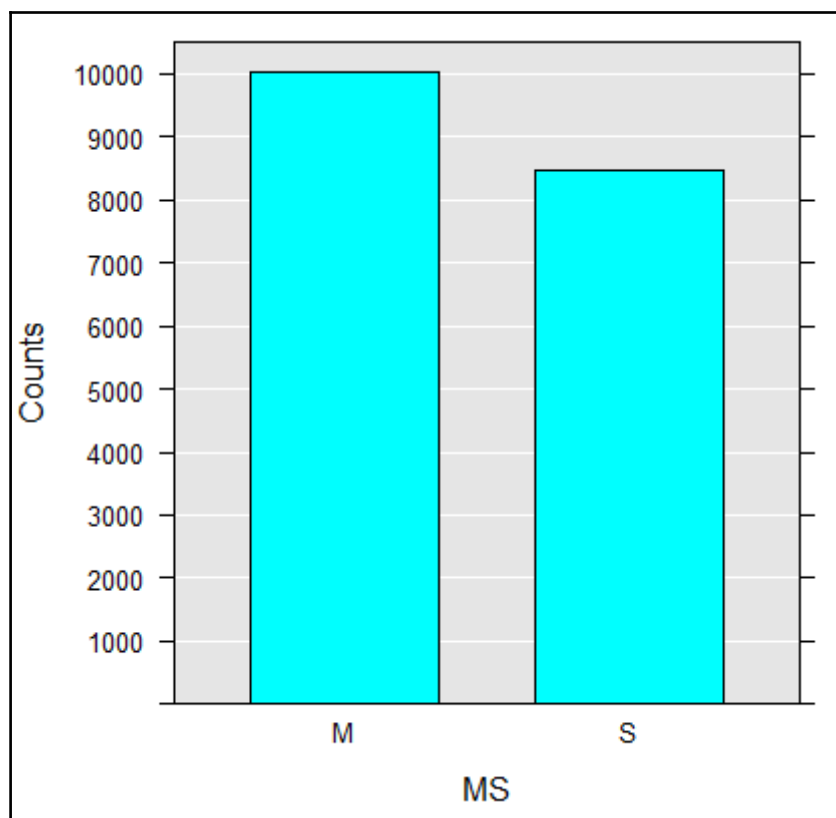
	ObjectName	ObjectValue
1	Object Name	df_sql
2	Number of Rows	701
3	Number of Variables	3

	VariableName	Mean	StdDev	Min	Max	Sum	ValidObs	MissingObs
1	TotalChildren	1.84435	1.61241	0	5	34091	18484	0

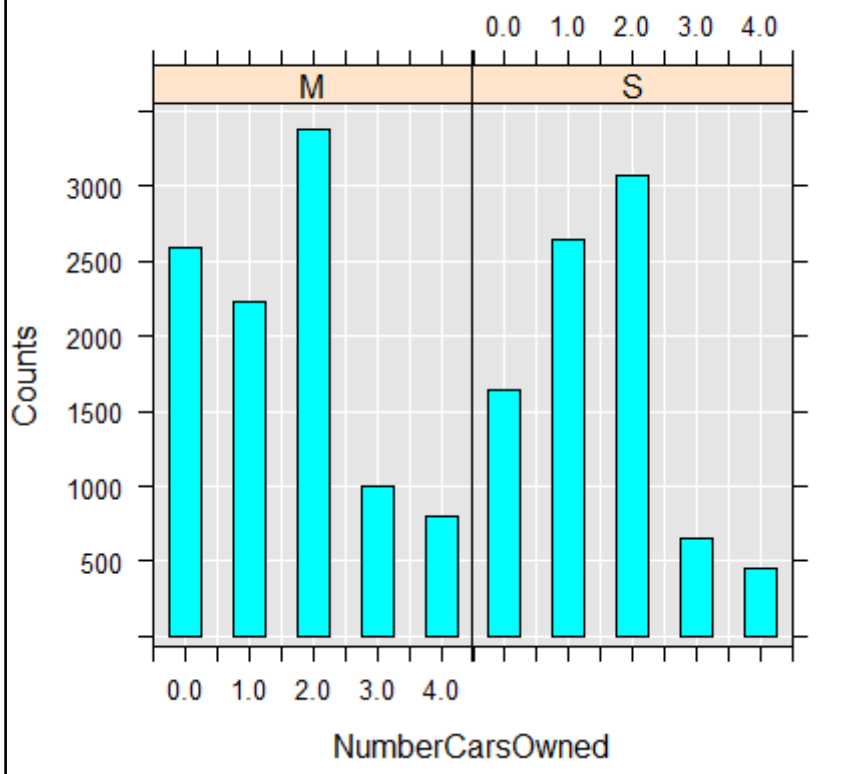
	VariableName	Mean	StdDev	Min	Max	Sum	ValidObs	MissingObs
1	BusinessEntityID	11532.7316598139	5340.9396113817	1699	20777	213171012	18484	0
2	TotalPurchaseYTD	302.986340678424	1354.34794576823	-3578,27	9650,76	5600399,5211	18484	0
3	DateFirstPurchase	1061273459,07812	23939747,4398502	993945600	1091232000	19616578617600	18484	0
4	BirthDate	-250140143,864964	355114394,405115	-1874102400	346636800	-4623590419199,99	18484	0
5	MaritalStatus	NULL	NULL	NULL	NULL	0	18484	0
6	YearlyIncome	NULL	NULL	NULL	NULL	0	18484	0
7	Gender	NULL	NULL	NULL	NULL	0	18484	0
8	TotalChildren	1,8443518718892	1,61240793484251	0	5	34090,9999999999	18484	0
9	NumberChildrenAtHome	1,00405756329799	1,52265965841342	0	5	18559	18484	0
10	Education	NULL	NULL	NULL	NULL	0	18484	0
11	Occupation	NULL	NULL	NULL	NULL	0	18484	0
12	HomeOwnerFlag	0,676368751352521	0,467873814762749	0	1	12502	18484	0
13	NumberCarsOwned	1,50270504219866	1,13839374115481	0	4	27776	18484	0

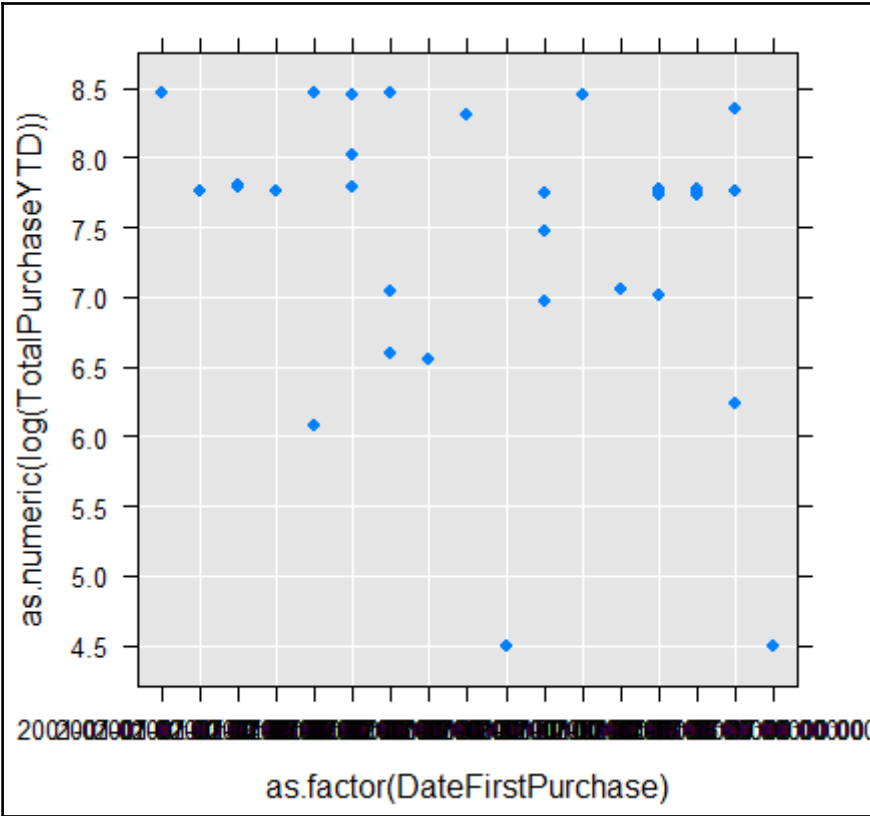


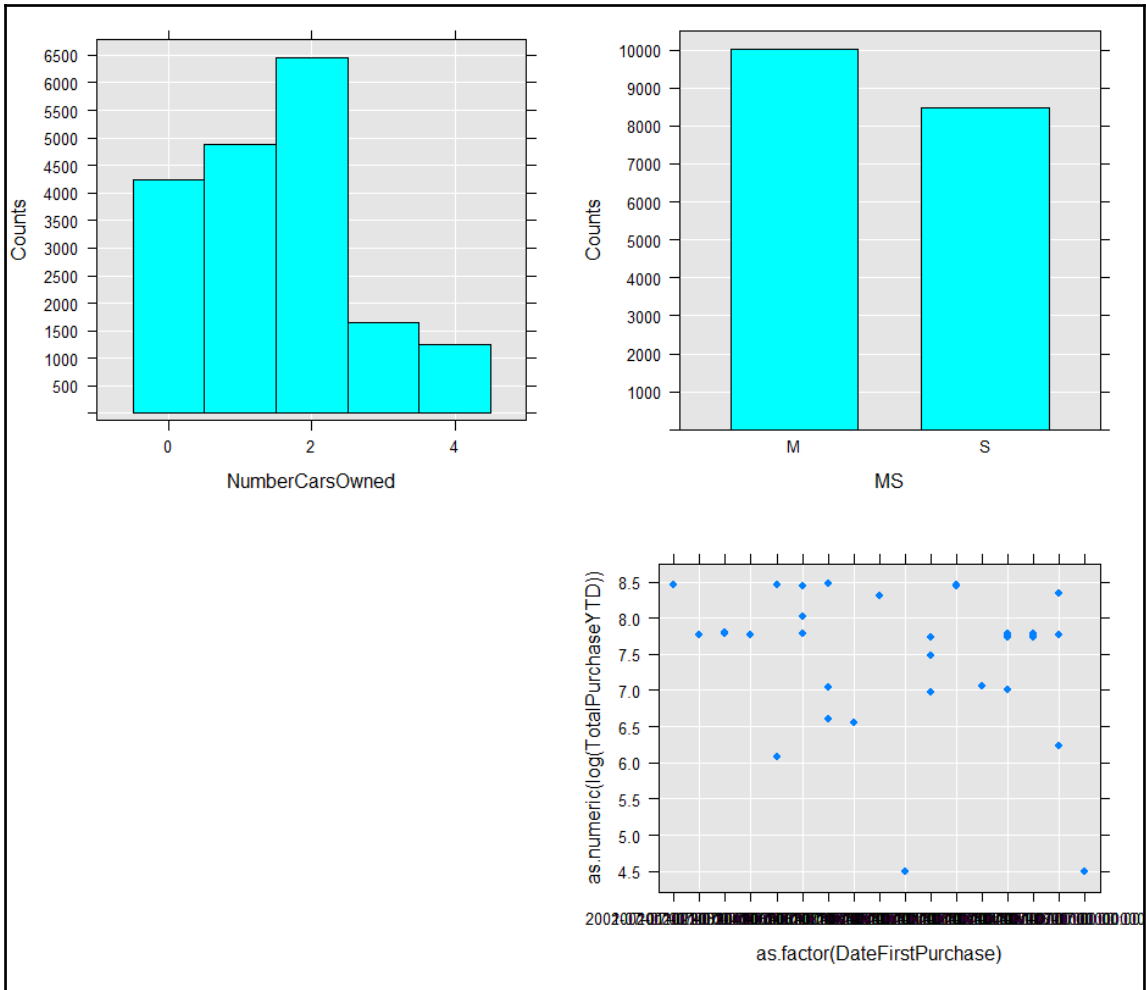




Cars owned per Marital Status





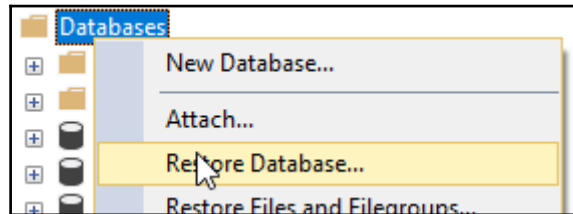


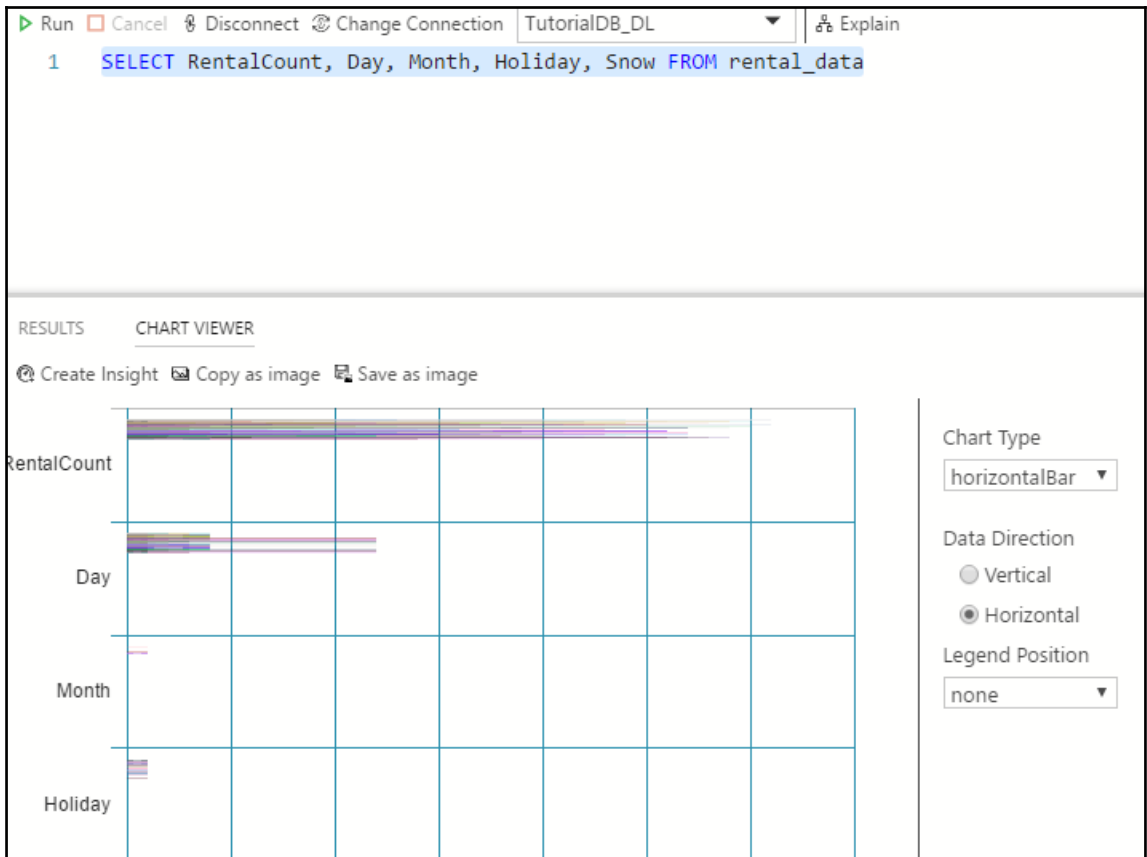
$$\chi_c^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

Chapter 6: Predictive Modeling

Before you begin

To run this sample, you need the following prerequisites:
[Download this DB backup file](#) and restore it using Setup.sql.



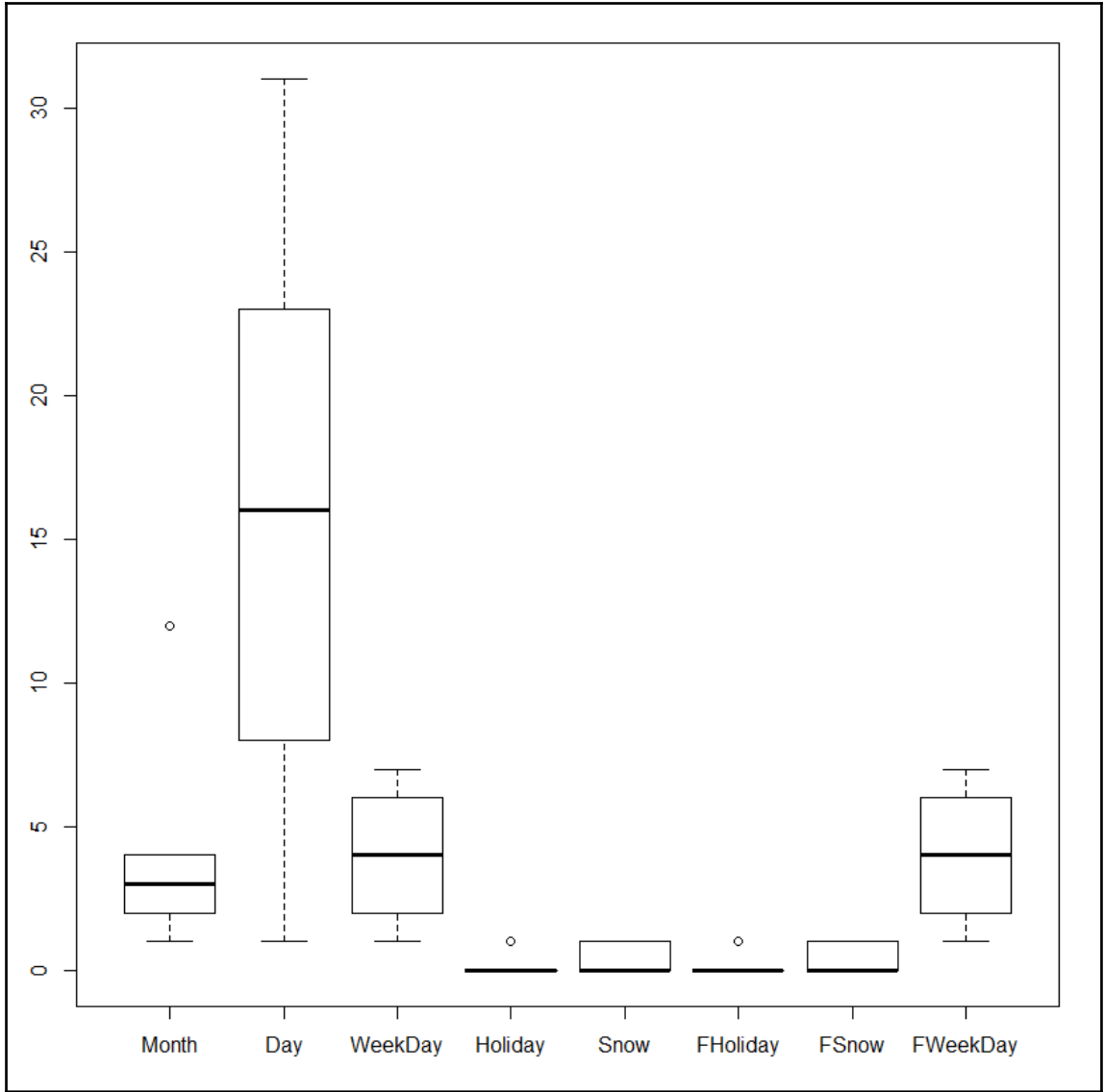


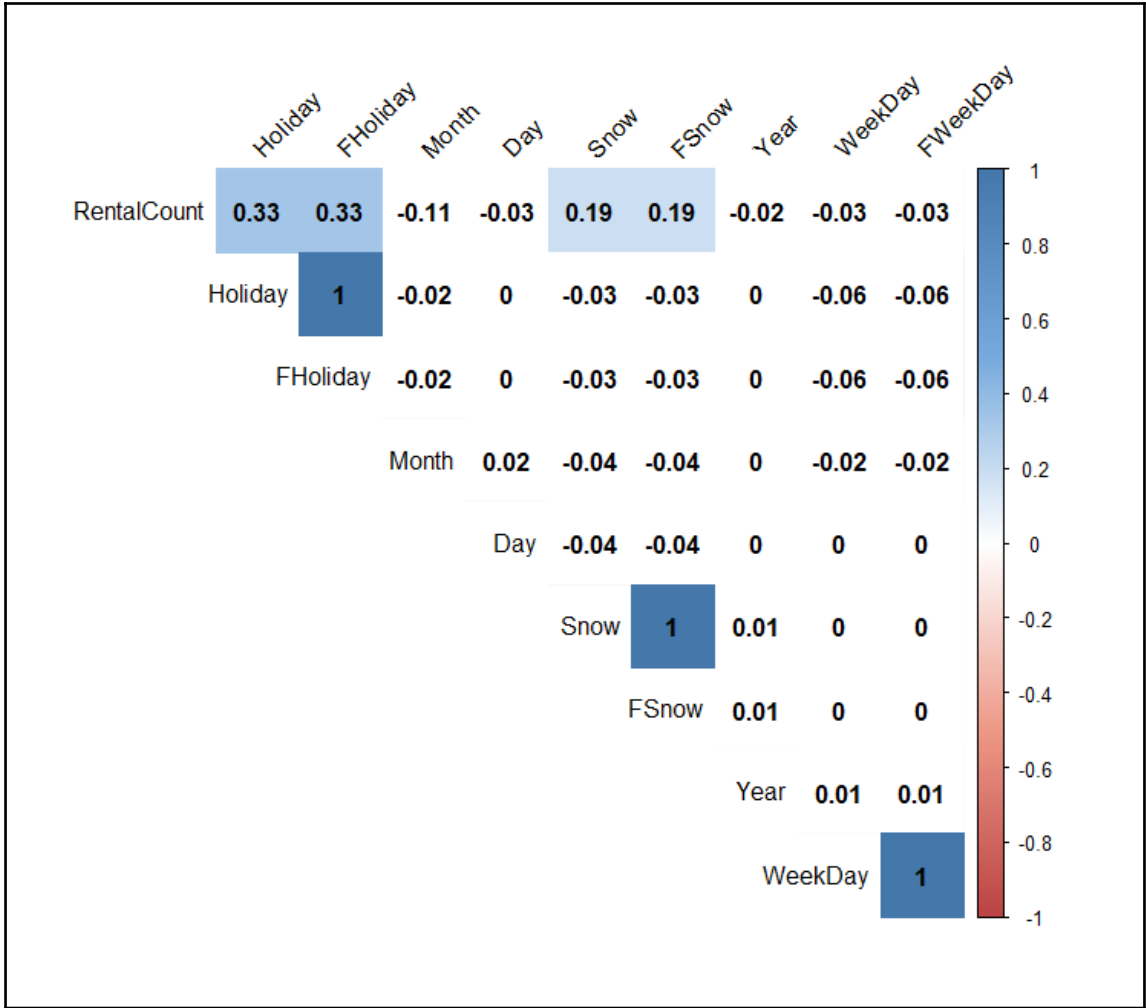
Editor Results Messages

	Name	Mean	StdDev	Min	Max	ValidObs	MissingObs
1	RentalCount	158.437	195.155	20	846	453	0
2	Year	2014.000	0.817	2013	2015	453	0
3	Month	4.450	3.971	1	12	453	0
4	Day	15.623	8.761	1	31	453	0
5	WeekDay	3.980	1.988	1	7	453	0
6	Snow	0.344	0.476	0	1	453	0
7	Holiday	0.026	0.161	0	1	453	0

	cor
1	0.332

	cor_HR	cor_FR	cor_MR	cor_YR
1	0.332	-0.028	-0.110	-0.021



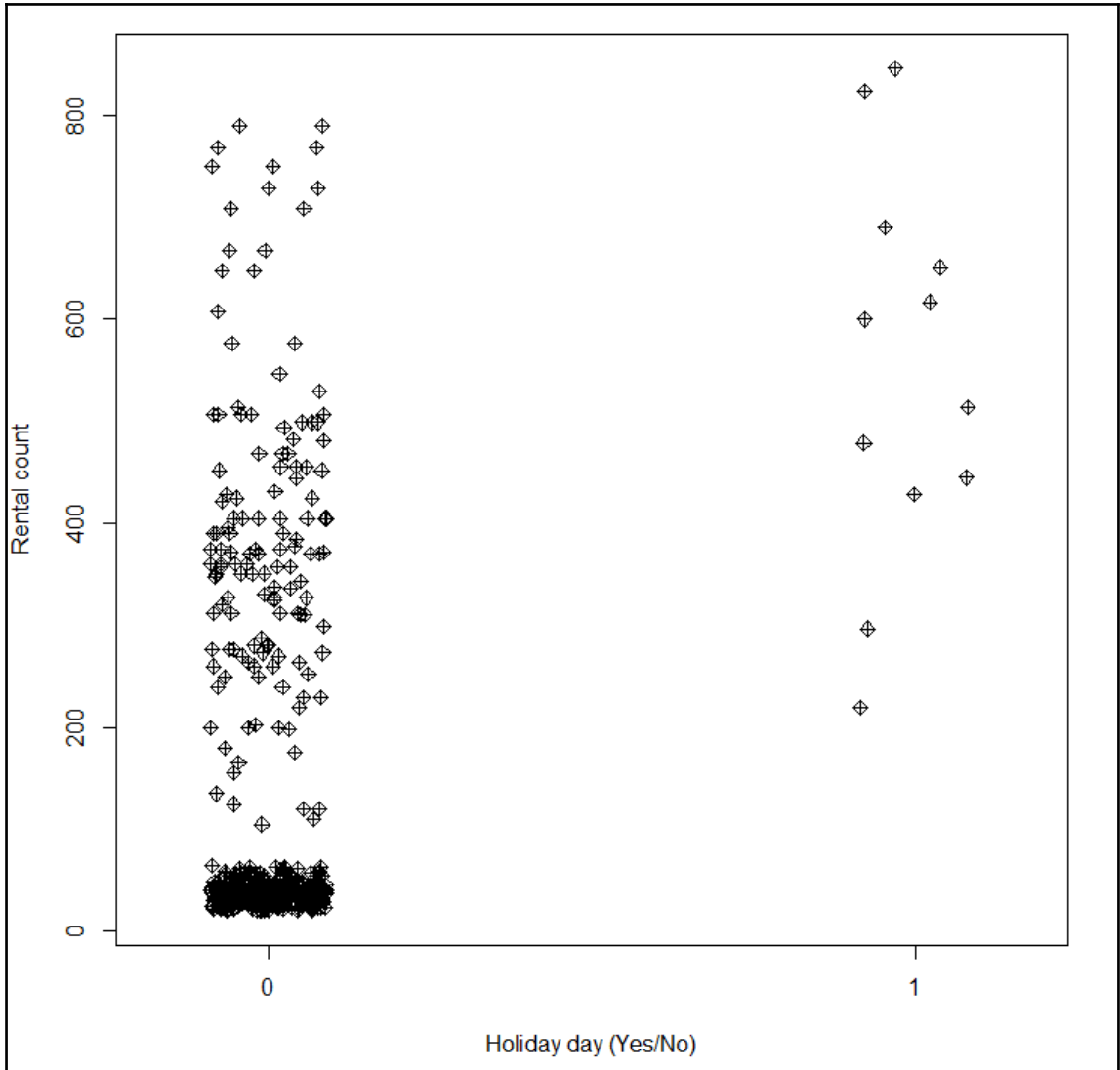


```

rxCovCor(formula = Formula_correlation, data = dr_rent, type = "cor")
Data: dr_rent
Number of valid observations: 453
Number of missing observations: 0
Statistic: cor
RentalCount      RentalCount      Year      Month      Day      weekDay      Snow      Holiday
RentalCount      1.00000000      -2.145545e-02      -0.10955985      -0.029875704      -0.027557065      0.186194501      0.332185334
Year              -0.02145545      1.000000e+00      0.00000000      0.000000000      0.010890454      0.005689906      0.000000000
Month            -0.10955985      3.174240e-13      1.00000000      0.020925350      -0.024926650      -0.036606201      -0.018729468
Day              -0.02987570      0.000000e+00      0.02092535      1.000000000      0.002235798      -0.043061766      0.002403086
weekDay          -0.02755706      1.089045e-02      -0.02492665      0.002235798      1.000000000      0.002571575      -0.060643119
Snow             0.18619450      5.689906e-03      -0.03660620      -0.043061766      0.002571575      1.000000000      -0.032761737
Holiday          0.33218533      0.000000e+00      -0.01872947      0.002403086      -0.060643119      -0.032761737      1.000000000

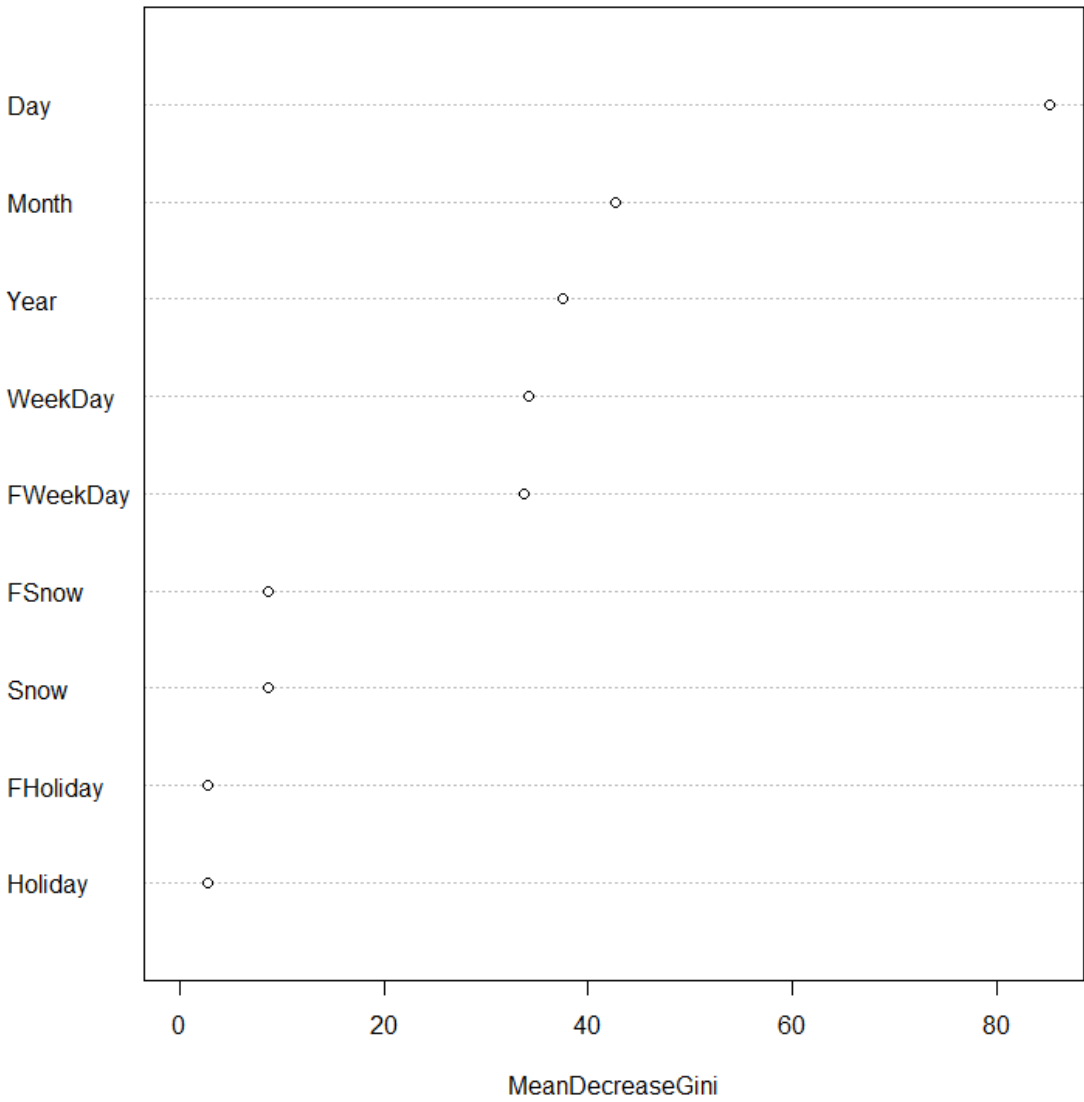
```

	F_Statistic	Statistical_Significance
1	55.9393	0.00000

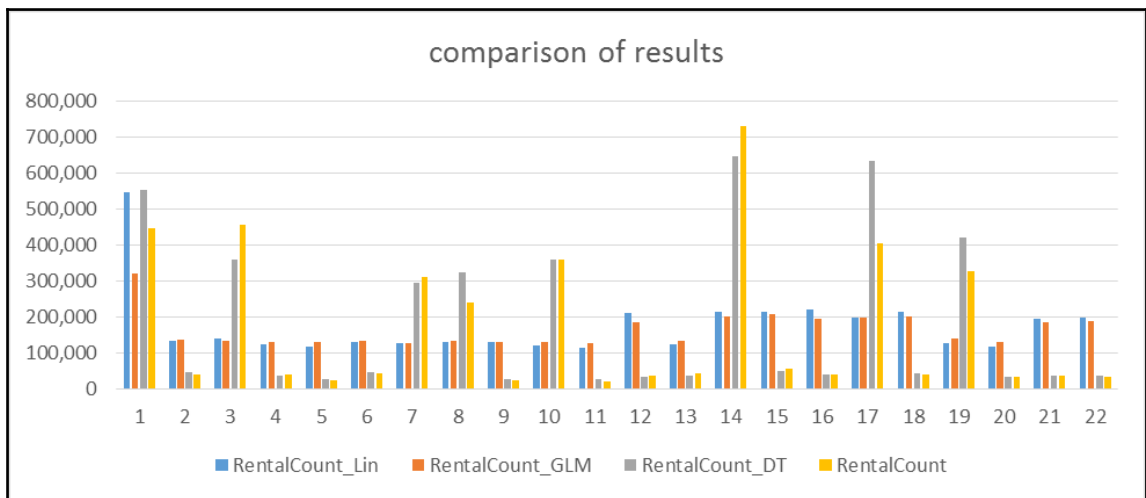


	Variable	MeanDecreaseGini
1	Year	39.34362
2	Month	46.37933
3	Day	89.72434
4	WeekDay	32.72640
5	Holiday	3.56413
6	Snow	10.27519
7	FHoliday	2.12951
8	FSnow	6.49198
9	FWeekDay	33.30637

fit_RF



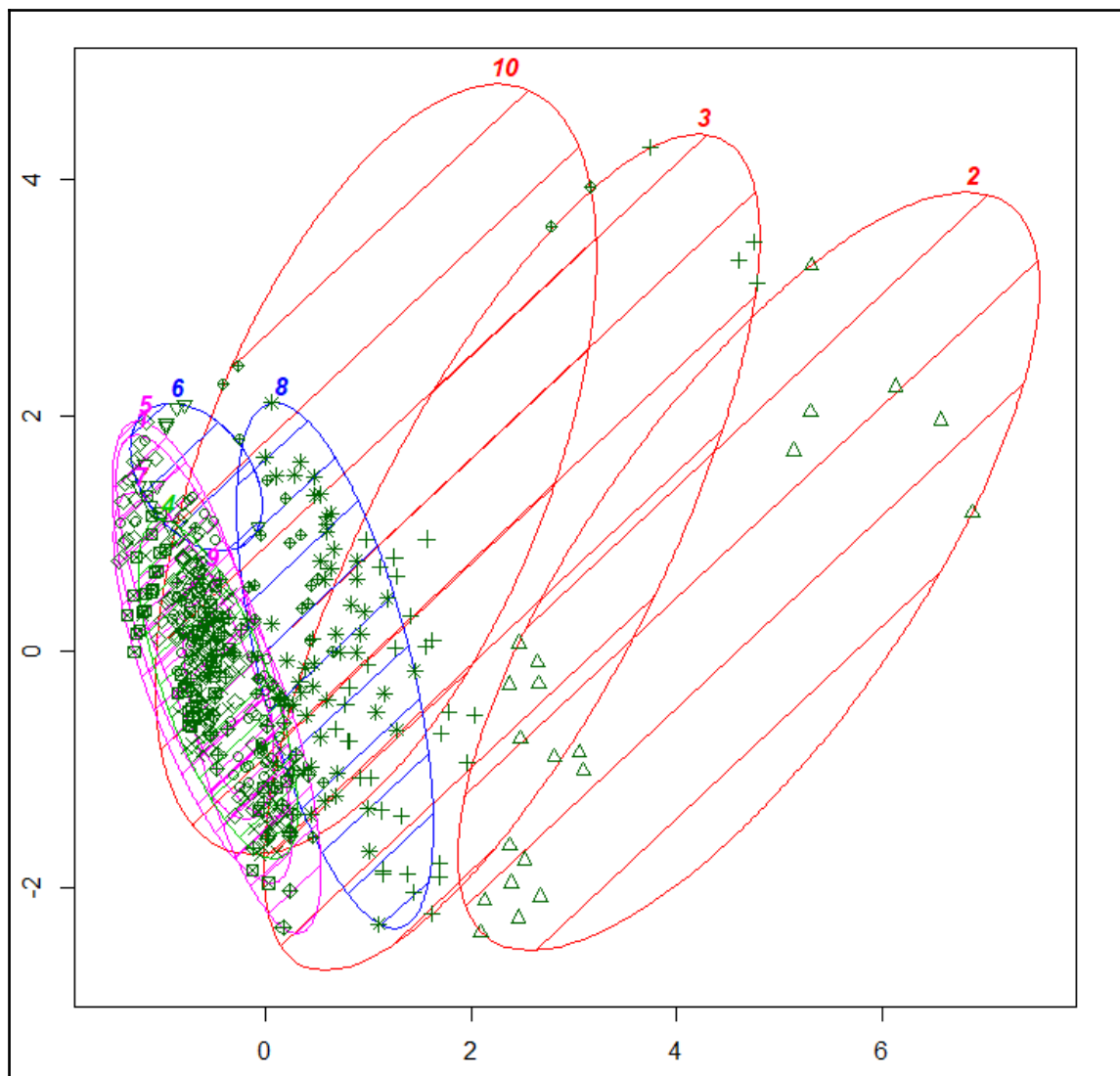
	RentalCount_Pred	RentalCount	Year	Month	Day	WeekDay	Snow	Holiday
4	37.083	38.000	2014	3	31	2	0	0
5	25.143	23.000	2014	4	24	5	0	0
6	46.556	42.000	2015	2	11	4	0	0
7	293.571	310.000	2013	4	28	1	0	0
8	321.636	240.000	2014	3	8	7	0	0
9	25.143	22.000	2013	4	5	6	0	0
10	359.133	360.000	2015	3	29	1	0	0
11	27.000	20.000	2015	4	22	4	0	0
12	33.692	36.000	2014	4	1	3	1	0
13	37.150	42.000	2015	3	6	6	0	0

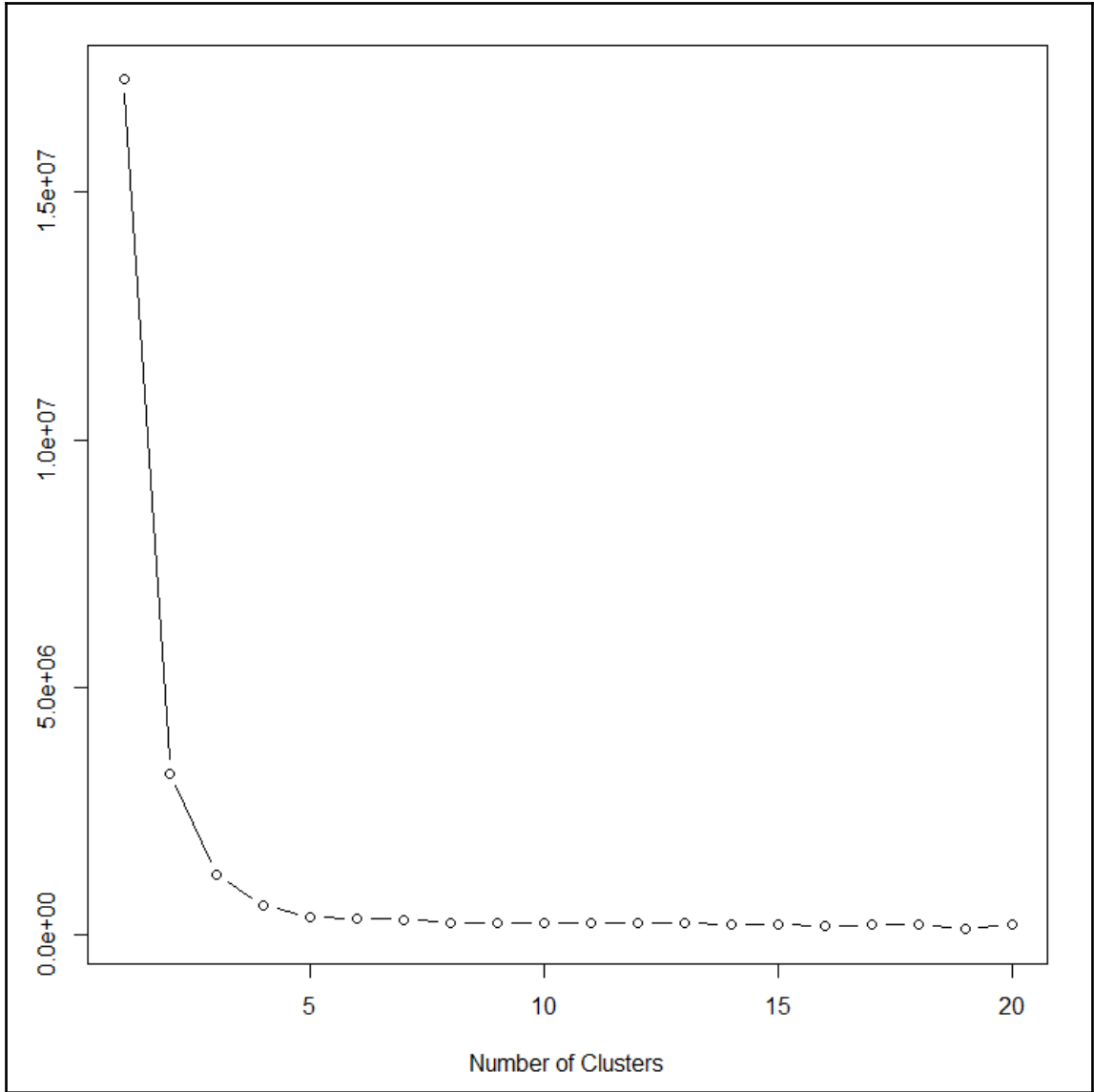


	model_name	model
1	Random_forest_V1	0x580A00000002000303030
2	Gradient_boosting_V1	0x580A00000002000303030
3	General_linear_model_V1	0x580A00000002000303030

Editor		Results		Messages	
	Prediction_new	OrigPredictecCount			
1	278.996	0			

	Year	Month	Day	RentalCount	WeekDay	Holiday	Snow	FHoliday	FSnow	FWeekDay
1	2014	4	12	390	7	0	0	0	0	7
2	2014	2	12	36	4	0	1	0	1	4
3	2014	12	12	40	6	0	1	0	1	6
4	2014	3	12	28	4	0	1	0	1	4
5	2014	1	12	425	1	0	1	0	1	1



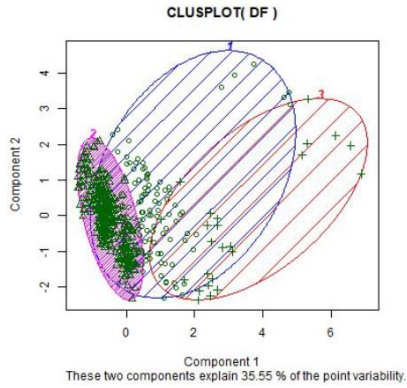


Select number of clusters: 3

1 of 1 100% Find | Next

Exploring Clusters - Rental data

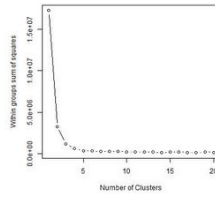
Number of selected clusters: 3



Cluster centers:

Year	Month	Day	Rental Count	Holiday	Snow
2014	5	16	339	0	0
2013	2	13	617	0	0
2014	4	15	40	0	0

Scree plot:

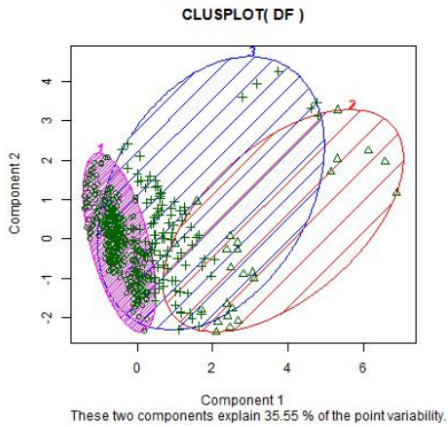


>

Select number of clusters: 3

Exploring Clusters - Rental data

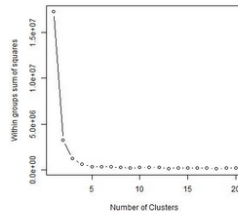
Number of selected clusters: 3



Cluster centers:

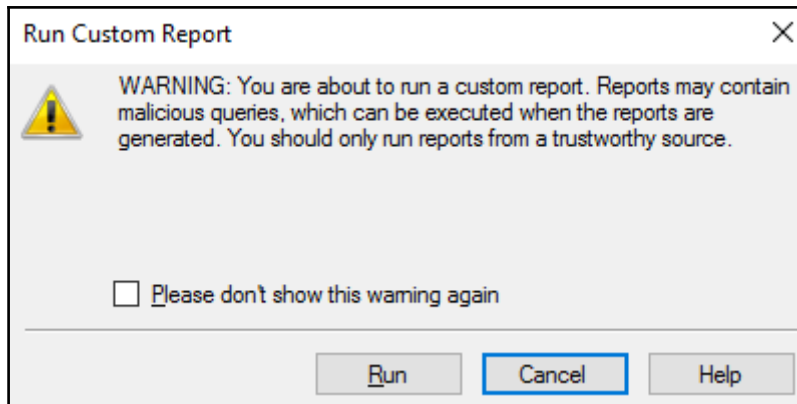
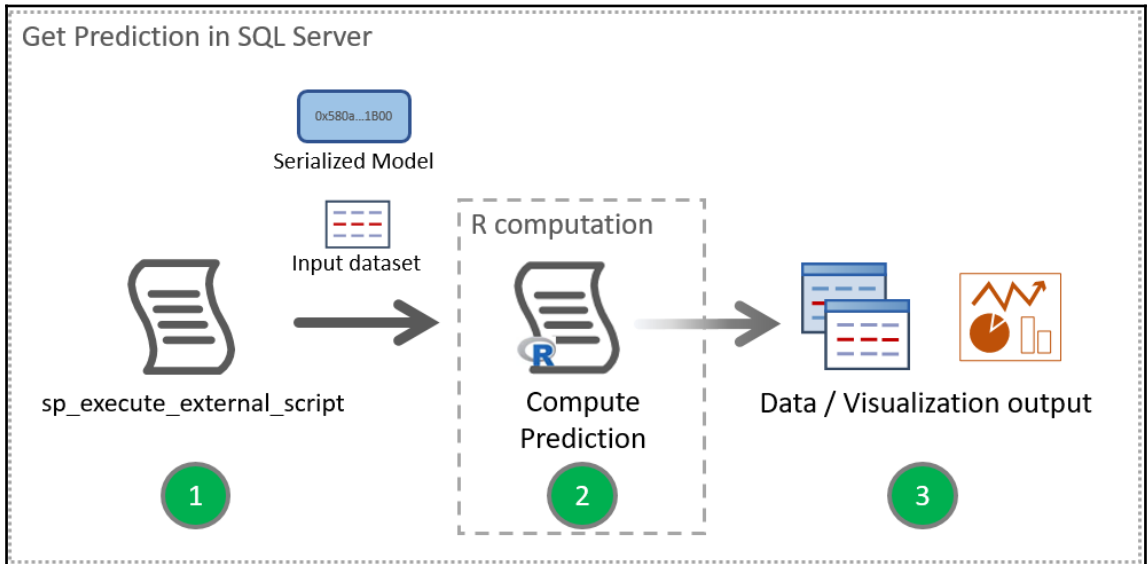
Year	Month	Day	Rental Count	Holiday	Snow
2014	5	16	339	0	0
2014	4	15	40	0	0
2013	2	13	617	0	0

Scree plot:



Chapter 7: Operationalizing R Code

Results		Messages		
	Model	AUC	CreatedOn	IsRealTimeScoring
1	0x580A00000020003030300020300000003130000001700000...	0.565357297728948	2017-10-11 18:21:52.660	0



SQL Server R Services - Execution Statistics

This report provides the execution statistics of sp_execute_external_script system stored procedure and rx* functions in RevoScaleR package (Microsoft R Server).

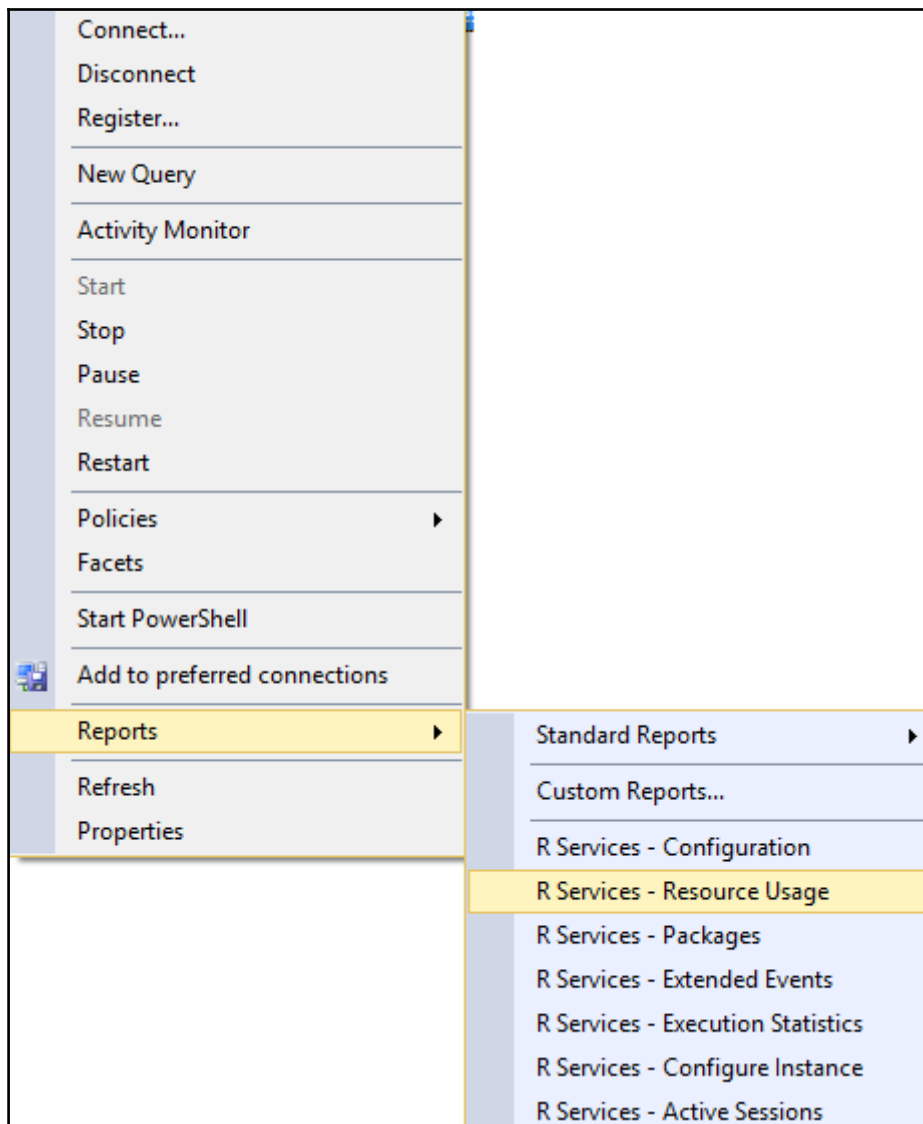
Statistics for sp_execute_external_script:

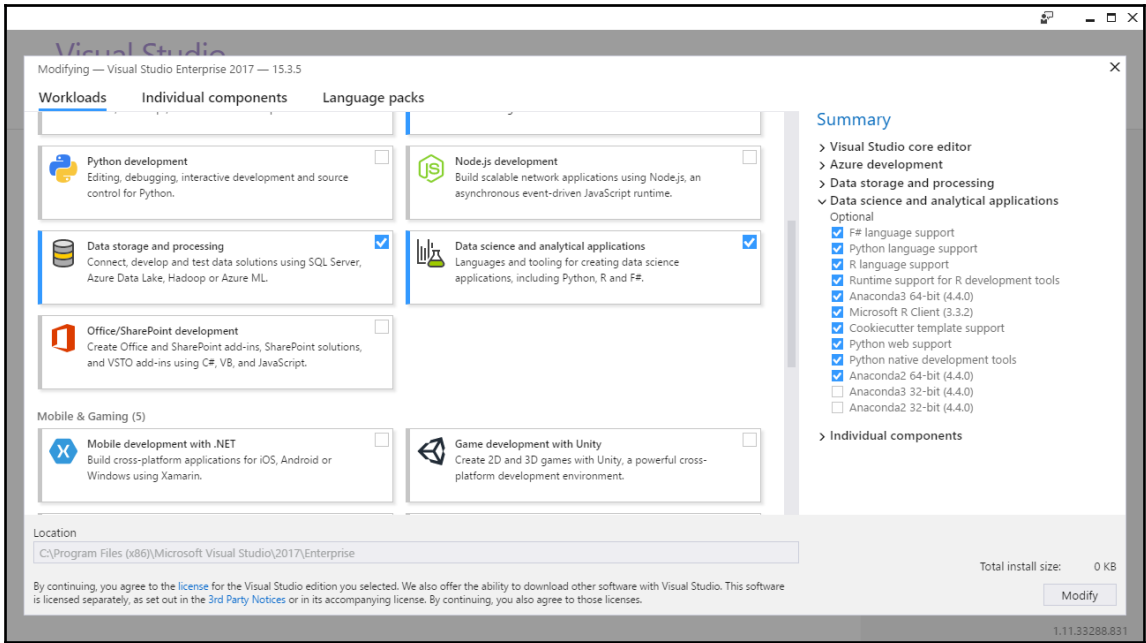
Counter Name	Counter Value
Execution Errors	24
Implied Auth. Logins	6
Parallel Executions	0
SQL CC Executions	7
Streaming Executions	0
Total Execution Time (ms)	736,265
Total Executions	38

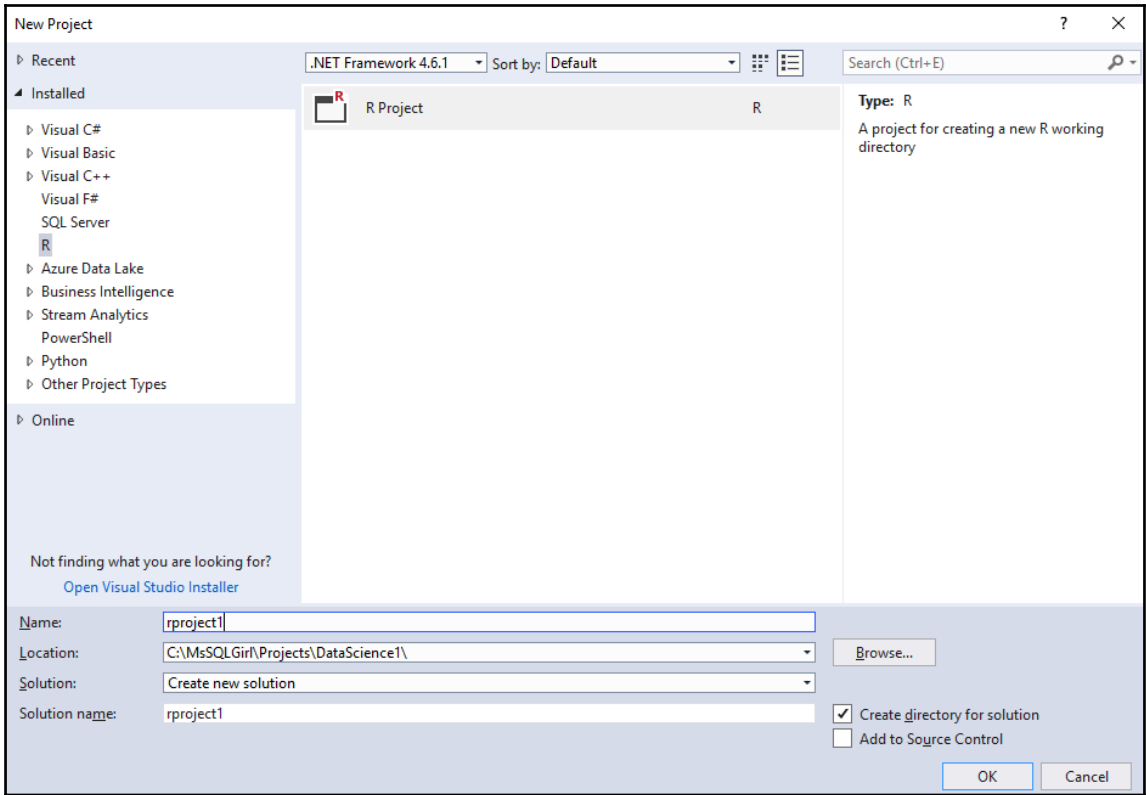
Statistics for RevoScaleR package:

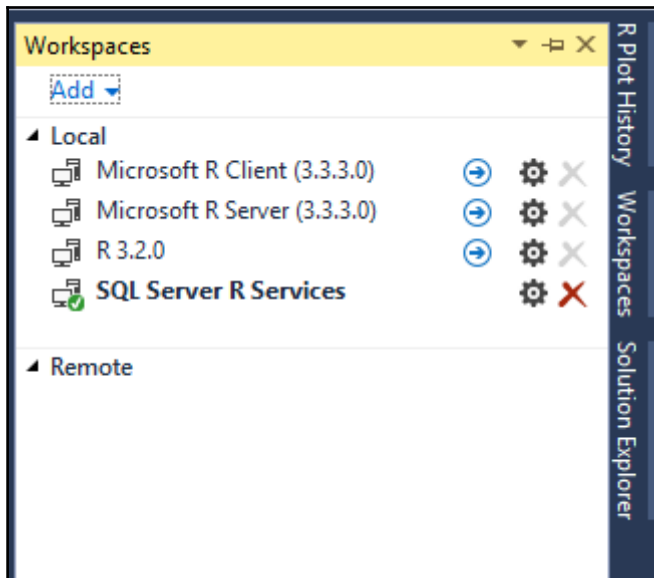
Counter Name	Counter Value
rxCube	12
rxDataStep	37
rxLogit	49
rxPredict_rxDTree	6
rxPredict_rxLogit	134
rxSummary	15

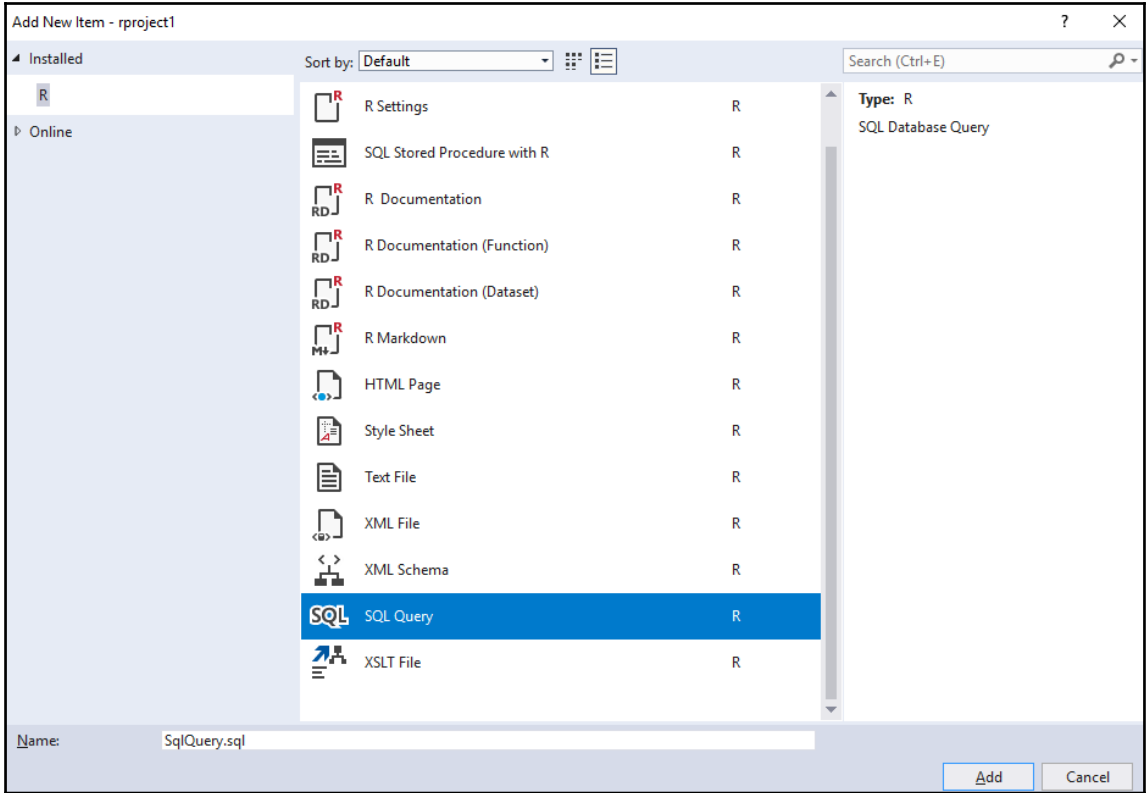
[View SQL script](#)

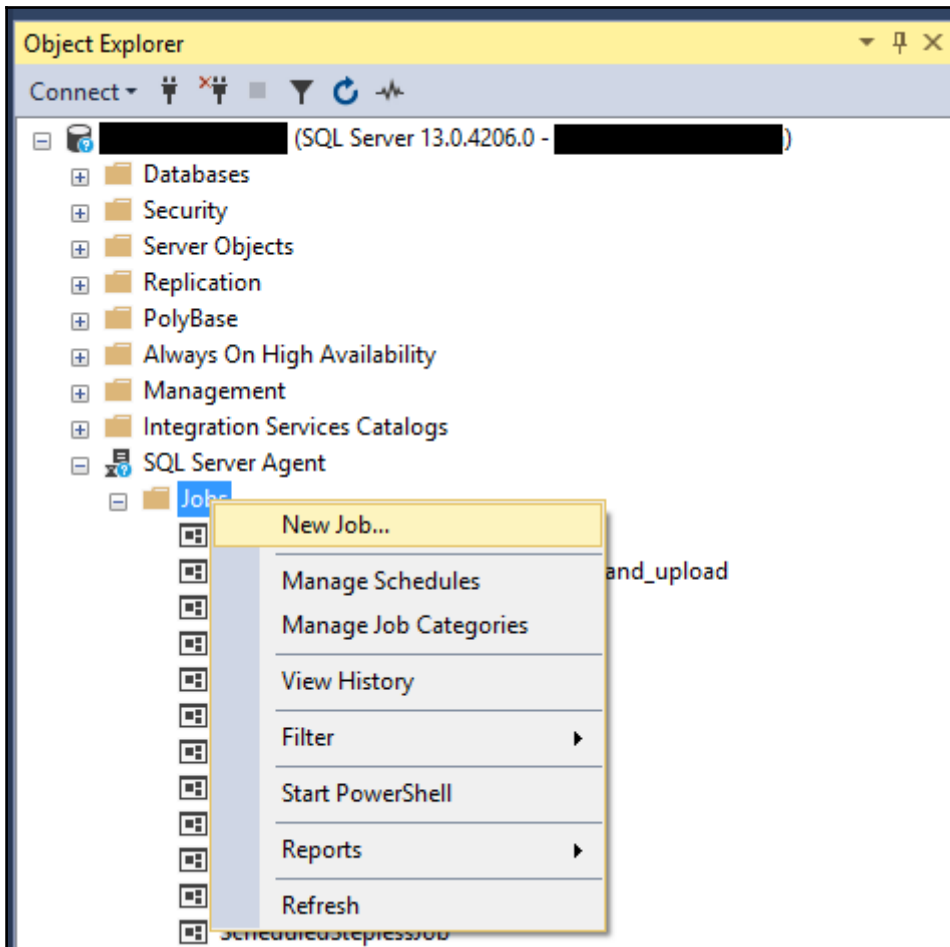












New Job

Select a page

- General
- Steps
- Schedules
- Alerts
- Notifications
- Targets

Script Help

Name: MonthlyTrainingModel

Owner: MsSQLGirl

Category: [Uncategorized (Local)]

Description: Refresh Taxi Tip Prediction Model on monthly basis

Enabled

Server: [REDACTED]

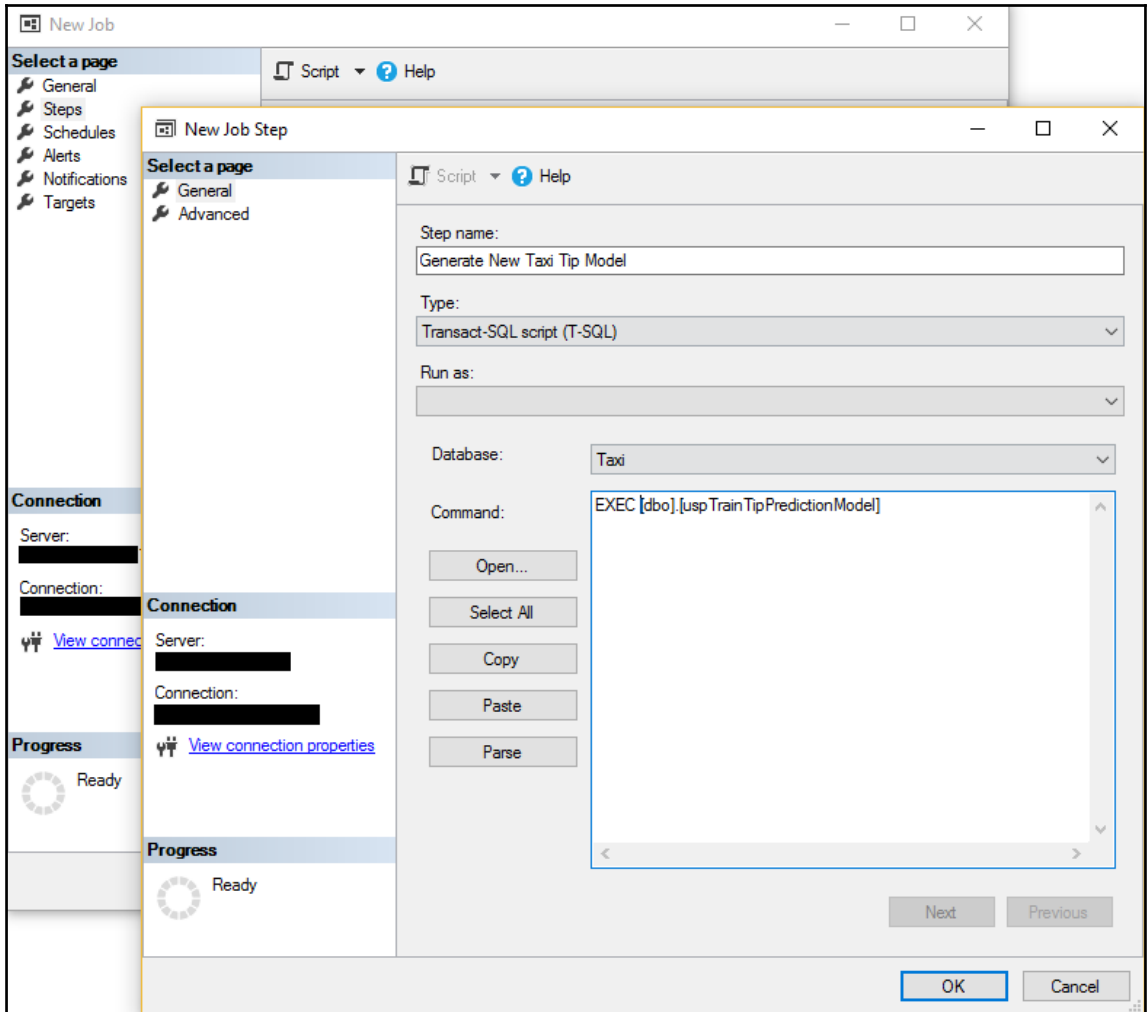
Connection: [REDACTED]

[View connection properties](#)

Progress

Ready

OK Cancel



Execute Process Task Editor

Configure the properties used to run a Win32 executable or a batch file as part of the package.

General
Process
Expressions

Process	
RequireFullFileName	True
Executable	Rscript.exe
Arguments	Rhello.R
WorkingDirectory	C:\Program Files\R\R-3.2.0\bin
StandardInputVariable	
StandardOutputVariable	User::OutputFromR
StandardErrorVariable	
FailTaskIfReturnCodesNotSuccessValue	True
SuccessValue	0
TimeOut	0
TerminateProcessAfterTimeOut	True
WindowStyle	Normal

RequireFullFileName
Indicates whether the task fails when the executable is not found on the specified path.

OK Cancel Help

Execute SQL Task Editor

Configure the properties required to run SQL statements and stored procedures using the selected connection.

General

Parameter Mapping

Result Set

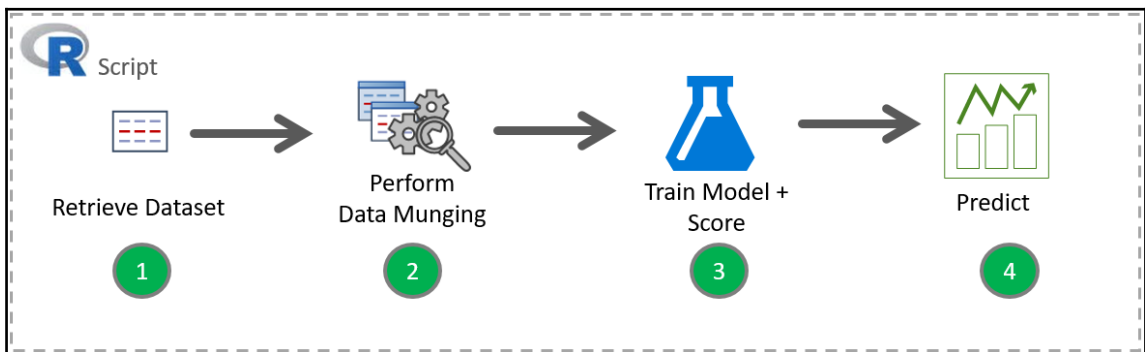
Expressions

General	
Name	Predict Tip (Single Mode)
Description	Predict Taxi Tip using R Script in SQL Server
Options	
TimeOut	0
CodePage	1252
TypeConversionMode	Allowed
Result Set	
ResultSet	Single row
SQL Statement	
ConnectionType	OLE DB
Connection	LocalHost.Taxi
SQLSourceType	Direct input
SQLStatement	EXEC [dbo].[uspPredictTipSingleMode] @pas
IsQueryStoredProcedure	False
BypassPrepare	True

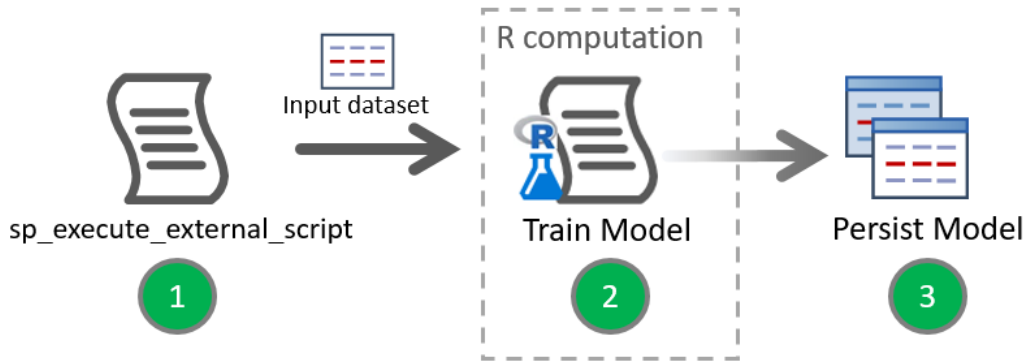
Description
Specifies the description of the task.

Browse... Build Query... Parse Query

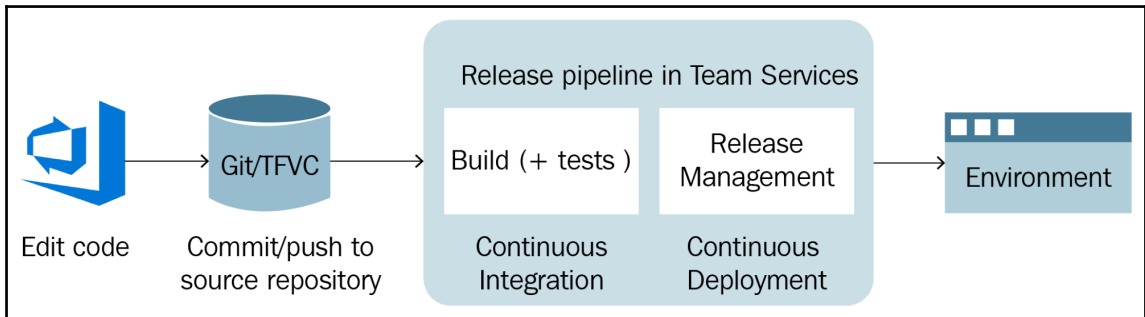
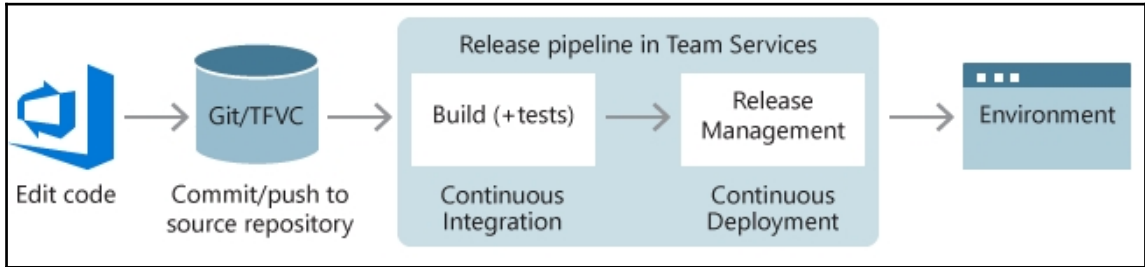
OK Cancel Help

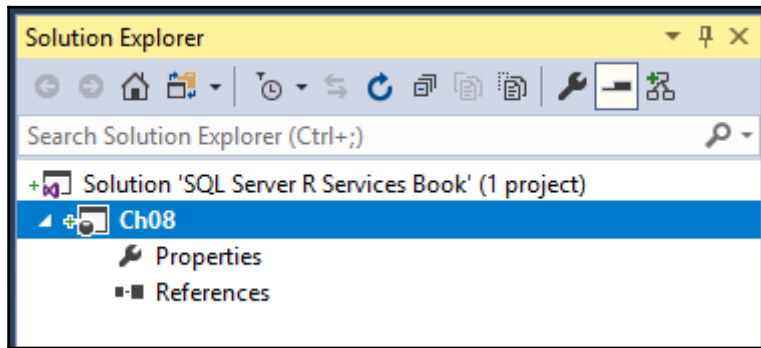
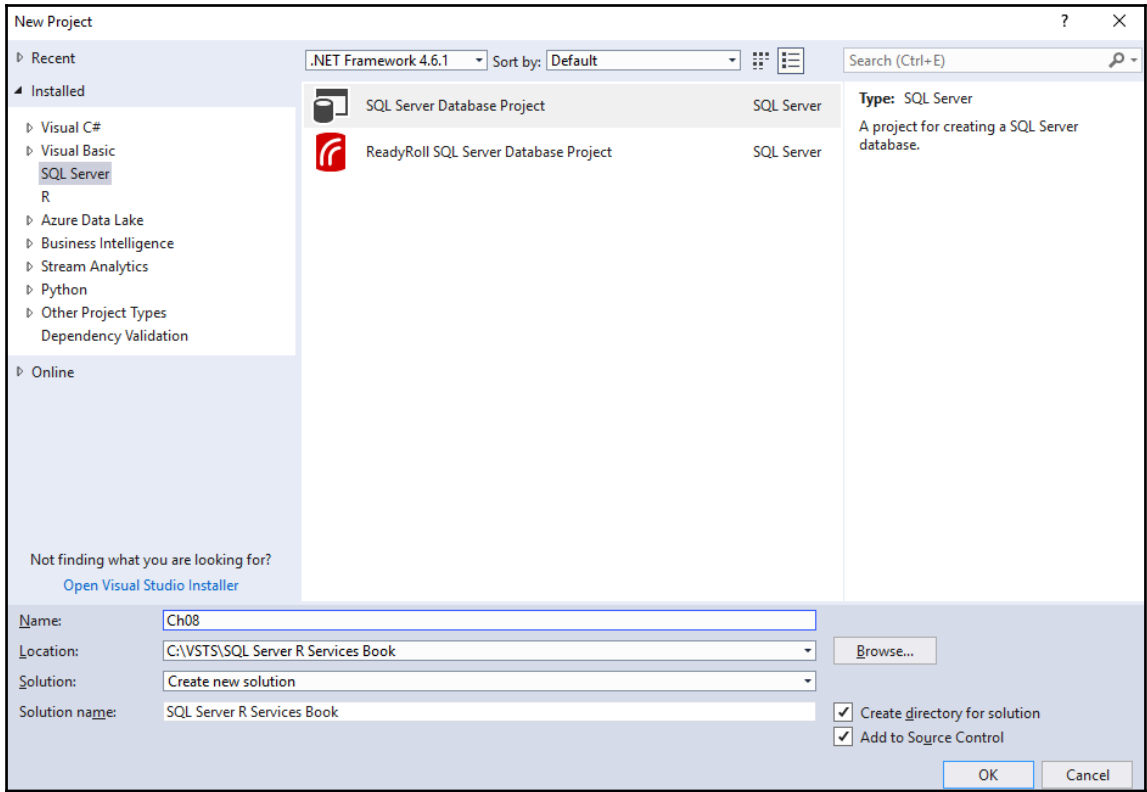


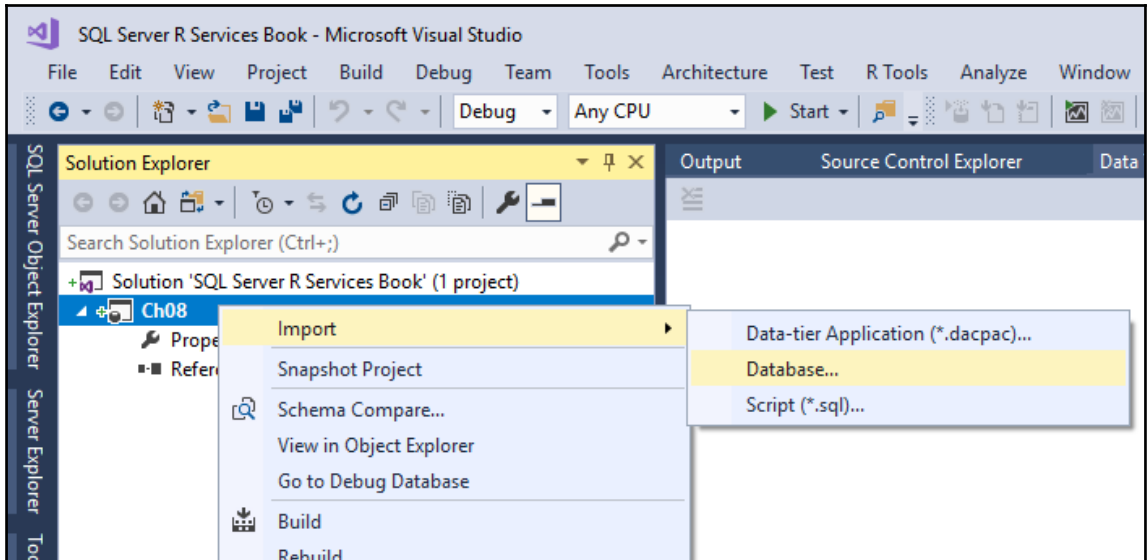
Create Predictive Model in SQL Server



Chapter 8: Deploying, Managing, and Monitoring Database Solutions containing R Code







Import Database

? X



Import Database

Source database connection:

JULIE1023.NYCTaxi (REDMOND\jukoesma)

Select Connection...

Target project

Name:

Location:

Browse...

- Create new solution
- Create directory for solution
- Add to source control

Import Settings

- Import application-scoped objects only
- Import referenced logins
- Import permissions
- Import database settings

Folder structure:

Schema\Object Type

Maximum files per folder:

1000

Start

Cancel

Import Database



Summary

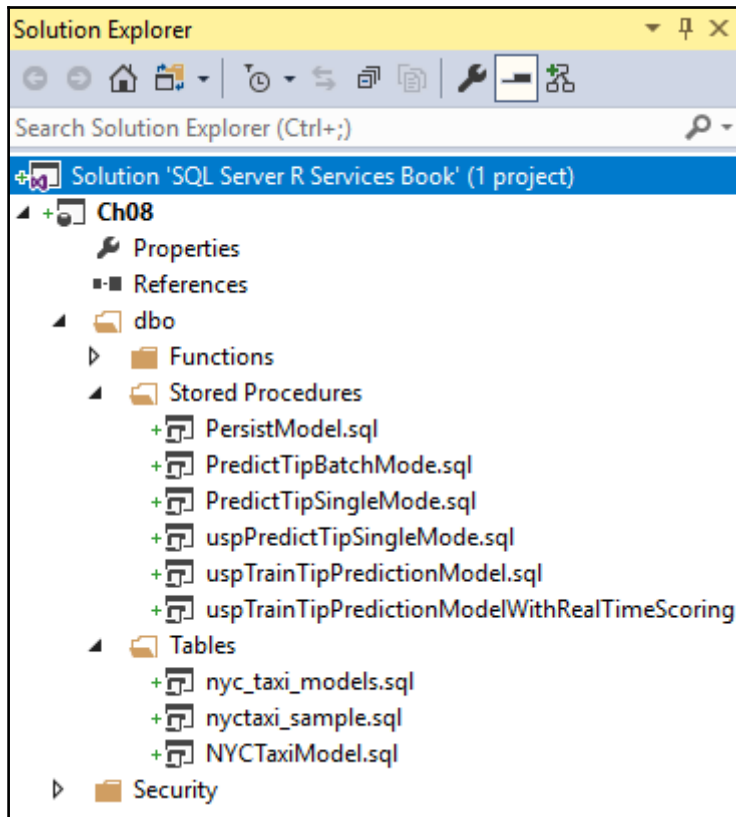
Status: Click Finish to continue...



- 12/29/2017 11:14:32 AM Gathering services
- 12/29/2017 11:14:32 AM Gathering event notifications
- 12/29/2017 11:14:32 AM Gathering remote service bindings
- 12/29/2017 11:14:32 AM Gathering broker priorities
- 12/29/2017 11:14:32 AM Gathering signatures
- 12/29/2017 11:14:32 AM Gathering data compression options
- 12/29/2017 11:14:32 AM Gathering sequence types
- 12/29/2017 11:14:32 AM Gathering security policies
- 12/29/2017 11:14:32 AM Gather column encryption keys
- 12/29/2017 11:14:32 AM Gathering column master keys
- 12/29/2017 11:14:32 AM Gathering external data sources
- 12/29/2017 11:14:32 AM Gathering external file formats
- 12/29/2017 11:14:32 AM Gathering external tables
- 12/29/2017 11:14:32 AM Gathering extended properties
- 12/29/2017 11:14:32 AM Gathering credentials
- 12/29/2017 11:14:32 AM Gathering logins
- 12/29/2017 11:14:32 AM Gathering server audits
- 12/29/2017 11:14:32 AM Scanning project for duplicate elements
- 12/29/2017 11:14:32 AM Finished duplicate element processing
- 12/29/2017 11:14:33 AM Finished importing database.
- 12/29/2017 11:14:33 AM A summary of the import was saved to the following location: C:\VSTS\SQL Server R Services Book\SQL Server R Services Book\Ch08\Import Schema Logs\Ch08_20171229071423.log
- 12/29/2017 11:14:33 AM Click Finish to continue...

Finish

Cancel



Add New Item - Ch08

Installed

Sort by: Default

Search (Ctrl+E)

- SQL Server
 - Programmability
 - Security
 - Service Broker
 - Server Objects
 - SQL CLR
 - SQL CLR C#
 - Storage
 - Tables and Views
 - User Scripts
 - SQL R
 - Visual Studio Templates
- Online

Item	Type
Database Trigger	SQL Server
Default	SQL Server
Extended Property	SQL Server
Inline Function	SQL Server
Rule	SQL Server
Scalar-valued Function	SQL Server
Sequence	SQL Server
Server Trigger	SQL Server
Stored Procedure	SQL Server
Stored Procedure (Natively Compiled)	SQL Server
Synonym	SQL Server
Table-valued Function	SQL Server
User-defined Data Type	SQL Server
User-defined Table Type	SQL Server

Name:

Add Cancel

Type: SQL Server
Transact-SQL script for Stored Procedure

Dev-NYTaxi.scmp | Output | Source Control Explorer | Data Tools Operations

C:\VSTS\SQL Server R Services Book\SQL Server R Services Book\Ch08\Ch08 | JULIE1023.NYCTaxi

Type	Source Name	Action	Target Name
▼ Add			
> Procedure	dbo.uspTrainTipPredictionModelWithRealTimeSc	✓+	

Results | Object Definitions

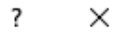
```
1 CREATE PROCEDURE [dbo].[uspTrainTipPredictionModelWithRealTimeScoringDTree]
2 AS
3 BEGIN
4     DECLARE @auc FLOAT;
5     DECLARE @model VARBINARY(MAX);
6
7     -- The data to be used for training
8     DECLARE @inquiry NVARCHAR(MAX) = N'
9         SELECT
10            tipped,
11            fare_amount,
12            passenger_count,
13            trip_time_in_secs,
14            trip_distance,
15            pickup_datetime,
16            dropoff_datetime,
17            dbo.fnCalculateDistance(pickup_latitude,
18            pickup_longitude,
19            dropoff_latitude,
20            dropoff_longitude) as direct_distance
21        FROM dbo.nyctaxi_sample
22        TABLESAMPLE (10 PERCENT) REPEATABLE (98052)';
23
24     -- Calculate the model based on the trained data and the AUC.
25     EXEC sys.sp_execute_external_script @language = N'R',
26         @script = N'
27         ## Create model
28         dTreeObj <- rxDTree(tipped ~ passenger_count +
29             trip_distance +
30             trip_time_in_secs +
31             direct_distance,
32             data = InputDataSet);
33
34         treeCp <- rxDTreeBestCp(dTreeObj);
35         dTreeObjChosen <- prune.rxDTree(dTreeObj, cp = treeCp);
36
37         ## Serialize model
38         model <- serialize(dTreeObjChosen, NULL);
```

Target object definition

100 % | 100 %

Comparison complete. Differences detected.

Create Unit Tests



Current selection:

- [-] Ch8
 - [+] Inline Functions
 - [+] Scalar-valued Functions
 - [+] Stored Procedures
 - dbo.PersistModel
 - dbo.PredictTipBatchMode
 - dbo.PredictTipSingleMode
 - dbo.uspPredictTipSingleMode
 - dbo.uspTrainTipPredictionModel
 - dbo.uspTrainTipPredictionModelWithRealTimeScoring
 - dbo.uspTrainTipPredictionModelWithRealTimeScoringDTree

Output project

Project:

New project name:

Output class

Insert unit test:

Create new class:

OK

Cancel

SQL Server Test Configuration - 'Ch08_Tests' ? X

Specify the SQL Server Test configuration settings for the current test project. These settings are stored in the app.config file in the test project. You must rebuild the test project before these settings are applied.

Database connections

Execute unit tests using the following data connection:

JULIE1023.NYCTaxi (REDMOND\jukoema)

Select Connection...

Use a secondary data connection to validate unit tests:

JULIE1023.NYCTaxi (REDMOND\jukoema)

Select Connection...

Deployment

Automatically deploy the database project before unit tests are run

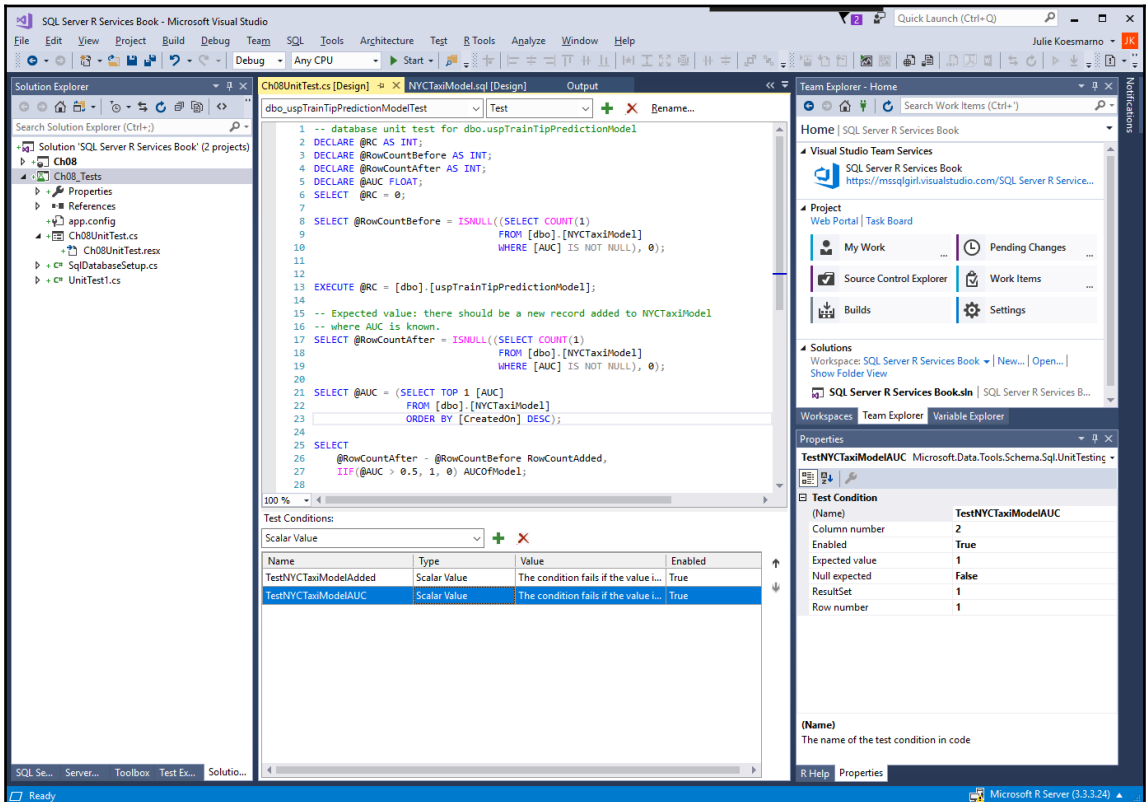
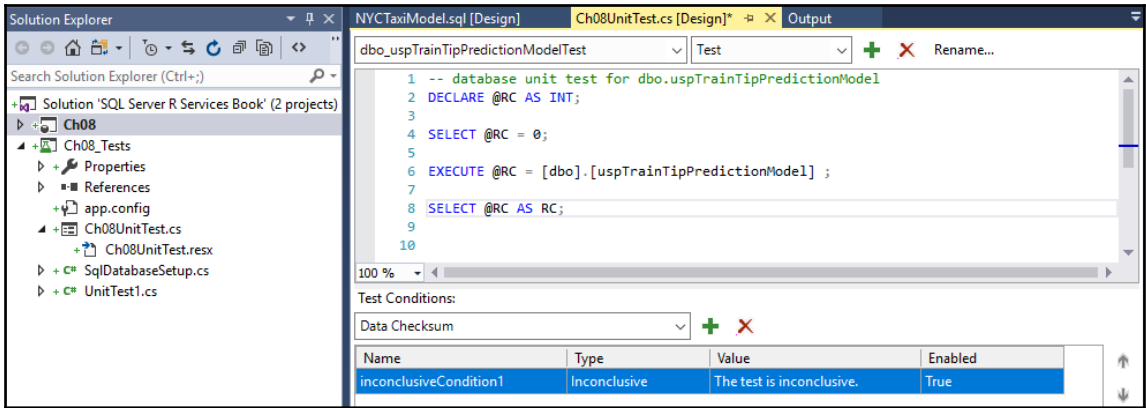
Database project:

(None selected) v ...

Deployment configuration:

(None selected) v

OK Cancel



Test Explorer

Run All | Run... | Playlist: All Tests

Passed Tests (1)

- dbo_ustipTrainTipPredictionModelTest 13 sec

dbo_ustipTrainTipPredictionModelT... Copy All

Source: Ch08UnitTest.cs line 111

Test Passed - dbo_ustipTrainTipPredictionModelT

Elapsed time: 0:00:13.09476

Output

Ch08UnitTest.cs [Design]

Test Name: dbo_ustipTrainTipPredictionModelTest

Test Outcome: ✔ Passed

Standard Output

Debug Trace:
Executing test initialization script...
1 batches, 0 ResultSets, 0 rows affected
Executing test script...
Sql Error: 'STDERR message(s) from external script:
Loading required package: gplots

Attaching package: 'gplots'

The following object is masked from 'package:stats':

lowess

' (Severity 0, State 2)
Sql Error: 'STDOUT message(s) from external script:
Rows Read: 170346, Total Rows Processed: 170346, Total Chunk Time: 0.018 seconds

Starting values (iteration 1) time: 0.030 secs.
Rows Read: 170346, Total Rows Processed: 170346, Total Chunk Time: 0.043 seconds

Iteration 2 time: 0.053 secs.
Rows Read: 170346, Total Rows Processed: 170346, Total Chunk Time: 0.052 seconds

Iteration 3 time: 0.059 secs.
Rows Read: 170346, Total Rows Processed: 170346
Warning: One or more fitted probabilities were numerically 0 or 1 during estimation.
, Total Chunk Time: 0.044 seconds

Iteration 4 time: 0.057 secs.
Rows Read: 170346, Total Rows Processed: 170346, Total Chunk Time: 0.037 seconds

Iteration 5 time: 0.045 secs.
Rows Read: 170346, Total Rows Processed: 170346
Warning: One or more fitted probabilities were numerically 0 or 1 during estimation. (similar message repeated 4 times)
, Total Chunk Time: 0.037 seconds

Iteration 6 time: 0.044 secs.

Elapsed computation time: 0.291 secs.

' (Severity 0, State 2)
Sql Error: 'STDOUT message(s) from external script:

SQL Se... Server... Toolbox Test Ex... Solutio...

Build succeeded

Team Explorer - Pending Changes

Search Work Items (Ctrl+')

Pending Changes | SQL Server R Services Book

SQL Server R Services Book

Check In | Shelve | Actions

Comment

Initial Check in

Related Work Items

Queries | Add Work Item by ID

Drag work items here to link them to the check-in.

Included Changes (27)

Exclude All | View Options

- C:\VSTS\SQL Server R Services Book\SQL Server R Services Book
 - Ch08
 - Change Management Scripts
 - dbo
 - Functions
 - Stored Procedures
 - Tables
 - Security
 - Ch08.sqlproj [add]
 - Dev-NYCTaxi.scmp [add]
 - NYCTaxiModel.sql [add]
 - Ch08_Tests
 - SQL Server R Services Book.sln [add]

Excluded Changes

Include All | View Options | Detected: 3 add(s), 2 delete(s)

Drag changes here to exclude from the check-in.


Workspaces | Team Explorer | Variable Explorer

SQL Server R Services B... | Dashboards | Code | Work | Build and Release | Search work items in this project

SQL Server R Services Book ☆

SQL Server R Services Book

Add tags




Use continuous integration

Improve code quality by detecting breaking changes as soon as they happen.

[Set up Build](#)

[Learn more about continuous integration](#)

No README.md found in `$/SQL Server R Services Book` [Change](#)




Add a README

Help others learn about your project

[Create README](#)


[Learn more about README files and what to include](#)

Members (1)

 [+](#)

Activity 7 Days ▾

Code



3
Changesets
by 1 authors

Build & Release [Set up Build](#)

No builds yet

Work [Add Work](#)

No work items yet

Tasks | Variables | Triggers | Options | Retention | History






Process
Some settings need attention

Get sources
SQL Server R Services Book | \$/SQL Server R Services Book

Phase 1
Run on agent

Name *

Agent queue * [Manage](#)

- Hosted**
-  Hosted
-  Hosted Linux Preview
-  Hosted macOS Preview
-  Hosted VS2017
- Private**
-  Default

SQL Server R Services B... Build and Release Search work items in this project

Builds Releases Library Task Groups Deployment Groups*

SQL Server R Services Book-CI Save & queue Discard Summary

Tasks Variables Triggers Options Retention History

Process
Build process

Get sources
SQL Server R Services Book
\$/SQL Server R Services Book

Build Phase
Run on agent

Build solution \$/SQL Server R...
MSBuild

Publish Artifact: DACPAC
Publish Build Artifacts

Publish Build Artifacts ⓘ Link settings Remove

Version 1.*

Display name *
Publish Artifact: DACPAC

Path to publish * ⓘ
\$(Build.Repository.LocalPath)\SQL Server R Services Book\Ch08
\bin\Debug

Artifact name * ⓘ
DACPAC

Artifact publish location * ⓘ
Visual Studio Team Services/TFS

Control Options

SQL Server R Services B... | Dashboards | Code | Work | Build and Release | Test | Wiki | Search work items in this project

Builds | Releases | Library | Task Groups | Deployment Groups*

SQL Server R Services Book-CI / Build 1

Edit build definition | Queue new build... | Download all logs as zip | Retain indefinitely | Release

Build succeeded

Build 1 R
Ran for 61 seconds (Default), completed 34 seconds ago

Summary | Timeline | Artifacts | Code coverage* | Tests

Build details

Definition	SQL Server R Services Book-CI (edit)
Source	\$/SQL Server R Services Book
Source version	72
Requested by	Julie Koesmarno
Queue name	Default
Queued	Monday, January 1, 2018 12:48 AM
Started	Monday, January 1, 2018 12:48 AM
Finished	Monday, January 1, 2018 12:49 AM
Retained state	Build not retained

Test Results

No test runs are available for this build.
Enable automated tests in your build definition by adding a task that runs tests for your test framework of choice, such as the [Visual Studio Test](#) task. If you choose to run tests using a custom task or runner, you can publish results using the [Publish Test Results](#) task.

Code Coverage

No build code coverage data available.

Tags

Add tag...

Deployments

No deployments found for this build. [Create release.](#)

Issues

Build Phase

- SQL Server R Services Book\Ch08\dbo\Stored Procedures\uspTrainTipPredictionModelWithRealTimeScoringDTree.sql (25, 8)
SQL Server R Services Book\Ch08\dbo\Stored Procedures\uspTrainTipPredictionModelWithRealTimeScoringDTree.sql(25,8):
Warning SQL71502: Procedure: [dbo].[uspTrainTipPredictionModelWithRealTimeScoringDTree] has an unresolved reference to object [sys].[sp_execute_external_script].
- SQL Server R Services Book\Ch08\dbo\Stored Procedures\uspTrainTipPredictionModelWithRealTimeScoringDTree.sql (25, 39)
SQL Server R Services Book\Ch08\dbo\Stored Procedures\uspTrainTipPredictionModelWithRealTimeScoringDTree.sql(25,39):
Warning SQL71502: Procedure: [dbo].[uspTrainTipPredictionModelWithRealTimeScoringDTree] has an unresolved reference to object [sys].[sp_execute_external_script].[@language].
- SQL Server R Services Book\Ch08\dbo\Stored Procedures\uspTrainTipPredictionModelWithRealTimeScoringDTree.sql (26, 35)

Artifacts Explorer

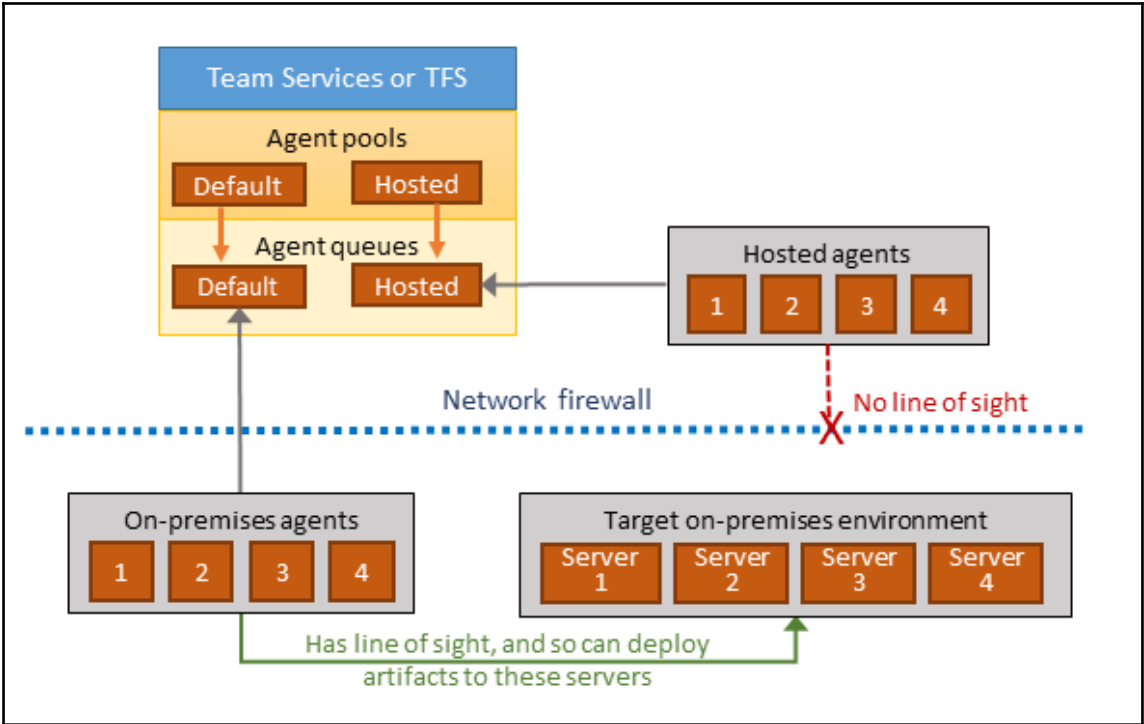
📁 DACPAC

📄 Ch08.dacpac

📄 Ch08.dll

📄 Ch08.pdb

Close



SQL Server R Services B... | Dashboards | Code | Work | Build and Release | Search work items in this project

Builds | Releases | Library | Task Groups | Deployment Groups*

SQL Server R Services Book-CI / Build 9

Edit build definition | Queue new build... | Download all logs as zip | Retain indefinitely | Release

Build succeeded

Build 9 Ran for 2.1 minutes (Default), completed 9 seconds ago

Summary | Timeline | Artifacts | Code coverage* | Tests

Build details

Definition: SQL Server R Services Book-CI (edit)
 Source: \$/SQL Server R Services Book
 Source version: 72
 Requested by: Julie Koesmarno
 Queue name: Default
 Queued: Monday, January 1, 2018 1:30 AM
 Started: Monday, January 1, 2018 1:30 AM
 Finished: Monday, January 1, 2018 1:32 AM
 Retained state: Retained by release

Test Results

Total tests: 1 (+1)
 Passed (1)
 Failed (0)
 Others (0)

Failed tests: 0 (+0)
 New (0)
 Existing (0)

Pass percentage: 100% (+100%)
 Run duration: 9s 934ms (+9s 934ms)

Issues

Build Phase

- SQL Server R Services Book\Ch08\dbo\Stored Procedures\uspTrainTipPredictionModelWithRealTimeScoringDTree.sql (25, 8)
 SQL Server R Services Book\Ch08\dbo\Stored Procedures\uspTrainTipPredictionModelWithRealTimeScoringDTree.sql (25,8): Warning SQL71502: Procedure: [dbo].[uspTrainTipPredictionModelWithRealTimeScoringDTree] has an unresolved reference to object [sys].[sp_execute_external_script].
- SQL Server R Services Book\Ch08\dbo\Stored Procedures\uspTrainTipPredictionModelWithRealTimeScoringDTree.sql (25, 39)
 SQL Server R Services Book\Ch08\dbo\Stored

Code Coverage
 No build code coverage data available.

Tags
 Add tag...

Deployments
 No deployments found for this build. [Create release.](#)

SQL Server R Services B... | Dashboards | Code | Work | Build and Release | Search work items in this project

Builds | Releases | Library | Task Groups | Deployment Groups*

SQL Server R Services Book-CI

Save & queue | Discard | Summary | Queue

Tasks | Variables | Triggers | Options | Retention | History

Continuous integration

SQL Server R Services Book
Enabled

Gated check-in

SQL Server R Services Book
Disabled

Scheduled + Add

3:00
Mon through Fri

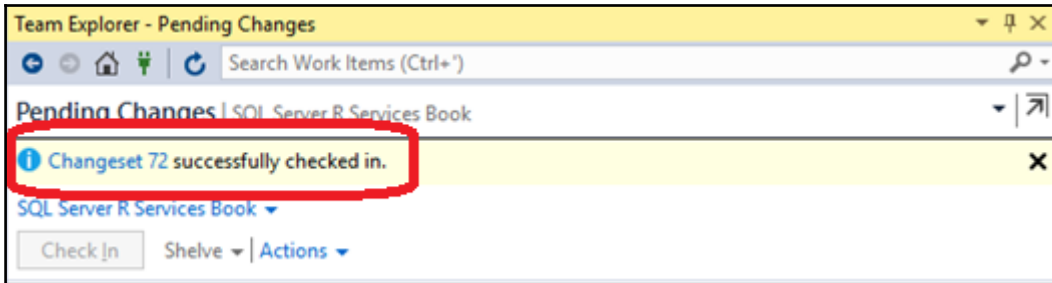
Mon through Fri at 3:00 Delete

When to build

Mon Tue Wed Thu Fri Sat Sun

03h 00m (UTC-08:00) Pacific Time (US & Canada)

Only schedule builds if the source or definition has changed



SQL Server R Services B... | Dashboards | Code | Work | Build and Release | Search work items in this project

Builds | Releases | Library | Task Groups | Deployment Groups*

Build Build_20171230.1

- Build Phase
 - Initialize Job
 - Get Sources
 - Build solution \$/SQL Server R Services...
 - Deploy using : dacpac
 - Post Job Cleanup
- Test Phase
 - Initialize Job
 - Get Sources
 - Run bcp
 - Unit Test
 - Post Job Cleanup

SQL Server R Services Book-CI / Build Build_20171230.1

Edit build definition | Queue new build... | Download all logs as zip | Retain indefinitely | Release

Build succeeded

Build Build_20171230.1
Ran for 2.4 minutes (Default), completed 82 seconds ago

Summary | Timeline | Code coverage* | Tests

Build details

Definition	SQL Server R Services Book-CI (edit)
Source	\$(SQL) Server R Services Book
Source version	72
Requested by	Microsoft.VisualStudio.Services.TFS on behalf of Julie Koesmaro
Queue name	Default
Queued	Saturday, December 30, 2017 2:39 PM
Started	Saturday, December 30, 2017 2:39 PM
Finished	Saturday, December 30, 2017 2:41 PM
Retained state	Build not retained

Test Results

Total tests: 1 (+0)

- Passed (1)
- Failed (0)
- Others (0)

Failed tests: 0 (+0)

- New (0)
- Existing (0)

Pass percentage: 100% (+0%)

Run duration: 9s 127ms (-2s 637ms)

[Detailed report >](#)

Code Coverage

No build code coverage data available.

Tags

Add tag...

Deployments

No deployments found for this build. [Create release.](#)

Issues

Build Phase

- SQL Server R Services Book\Ch08\dbo\Stored Procedures\uspTrainTipPredictionModelWithRealTimeScoringDTree.sql (25, 8)
SQL Server R Services Book\Ch08\dbo\Stored Procedures\uspTrainTipPredictionModelWithRealTimeScoringDTree.sql (25,8): Warning SQL71502: Procedure: [dbo].[uspTrainTipPredictionModelWithRealTimeScoringDTree] has an unresolved reference to object [sys].[sp_execute_external_script].
- SQL Server R Services Book\Ch08\dbo\Stored Procedures\uspTrainTipPredictionModelWithRealTimeScoringDTree.sql (25, 39)
SQL Server R Services Book\Ch08\dbo\Stored Procedures\uspTrainTipPredictionModelWithRealTimeScoringDTree.sql (25,39): Warning SQL71502: Procedure: [dbo].[uspTrainTipPredictionModelWithRealTimeScoringDTree] has an unresolved reference to object [sys].[sp_execute_external_script]. [@language].
- SQL Server R Services Book\Ch08\dbo\Stored


Create new release for UAT Release



Release Description

Artifacts

Source Alias

Version 

SQL Server R Services Book-CI (Build)

Automated deployments

Environments to which deployments will be triggered automatically. You can choose to disable automated deployment to an environment.

Environment

Deployment trigger

UAT

Create

Cancel

SQL Server R Services B... | Build and Release | Search work items in this project

Builds | Releases | Library | Task Groups | Deployment Groups*

UAT Release / Release-6

Summary | Environments | Artifacts | Variables | General | Commits | Work items | Tests | Logs | History

Deploy | Save | Abandon | Send Email

Details

Test definition

Manually created by Julie Koesmarno a minute ago

SQL Server R Services Book-CI / 9 (Build) \$/SQL Server R Services Book

Environments

Environment	Actions	Deployment status	Triggered	Completed	Tests
UAT	...	SUCCEEDED	a minute ago	just now	No tests

Issues

No issues reported in this release.

Work items

No associated work items found.

Tags

Add...

SQL Server R Services B... ▾ Dashboards Code

Builds Releases Library Task Groups Deployment

All definitions > UAT Release

Pipeline Tasks Variables Retention Options

Artifacts | + Add

Continuous deployment trigger

SQL Server R Services Book-CI

Schedule not set

Environments |

SQL Server R Services B... Build and Release Search work items in this project

Builds Releases Library Task Groups Deployment Groups*

UAT Release / Release-7

Summary Environments Artifacts Variables General Commits Work items Tests Logs History

Refresh Deploy Save Abandon Send Email

Release Definitions

All release definitions

UAT Release ...

Search release definitions...

Triggered by SQL Server R Services Book-CI Build_20180101.1.

Continuous deployment requested for Julie Koesmarno 4 minutes ago

SQL Server R Services Book-CI / Build_20180101.1 (Build) \$/SQL Server R Services Book

Environments

Environment	Actions	Deployment status	Triggered	Completed	Tests
UAT	...	SUCCEEDED	4 minutes ago	3 minutes ago	No tests

Issues

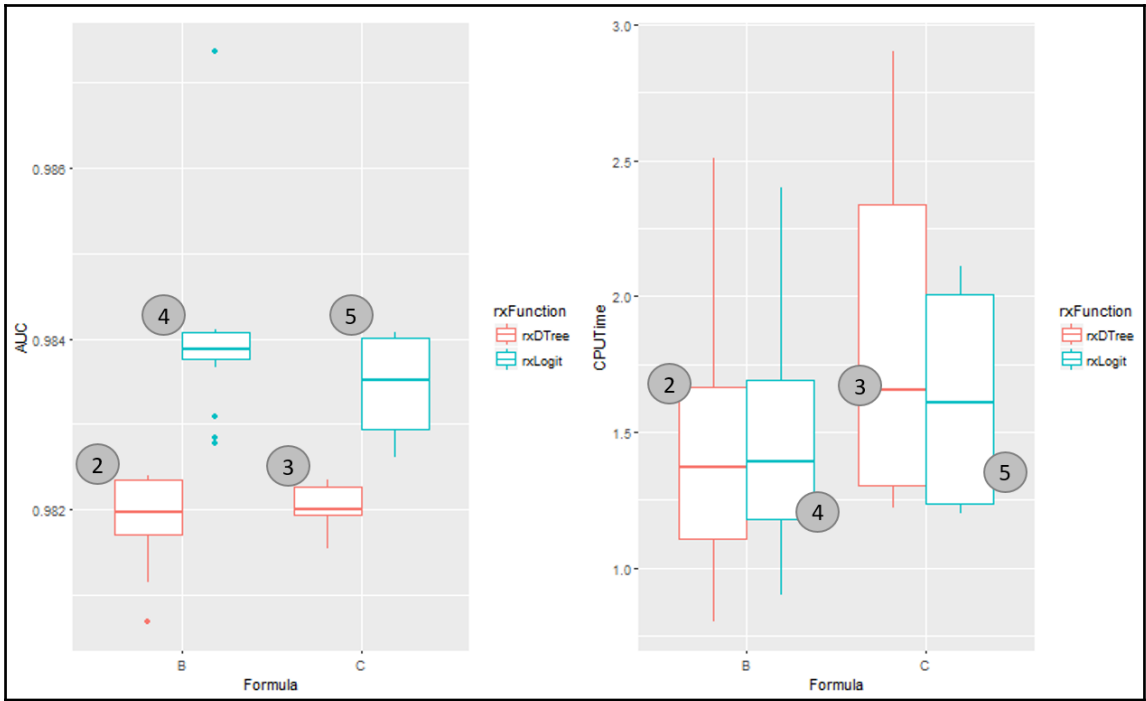
No issues reported in this release.

Work items

No associated work items found.

Tags

Add...



Chapter 9: Machine Learning Services with R for DBAs

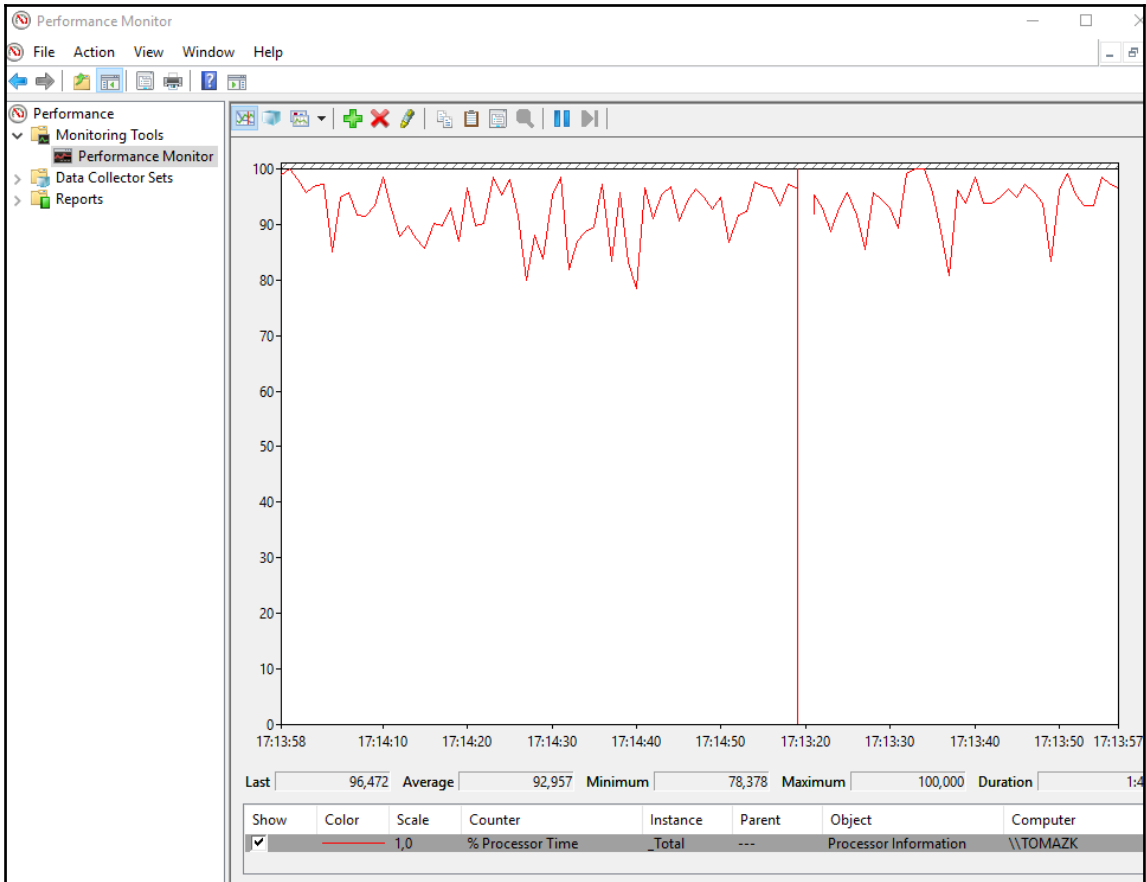
	With_DD_OFF	With_DD_ON
1	38	6

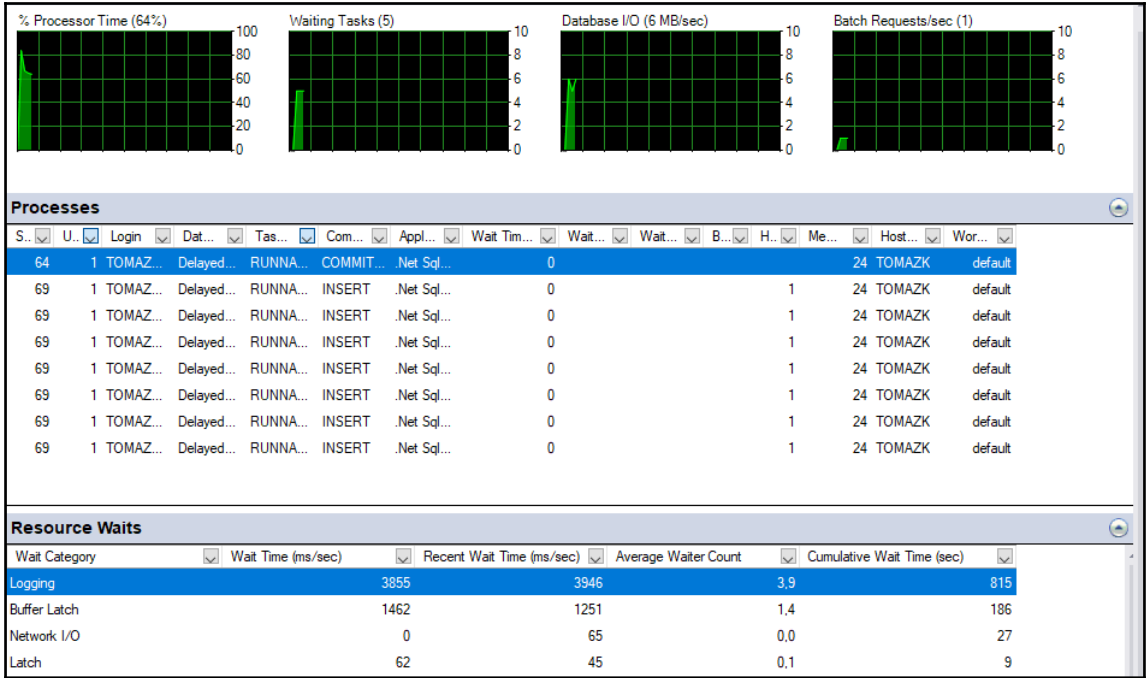
The screenshot shows the SQLQueryStress application interface. The main window contains a query editor with the following T-SQL code:

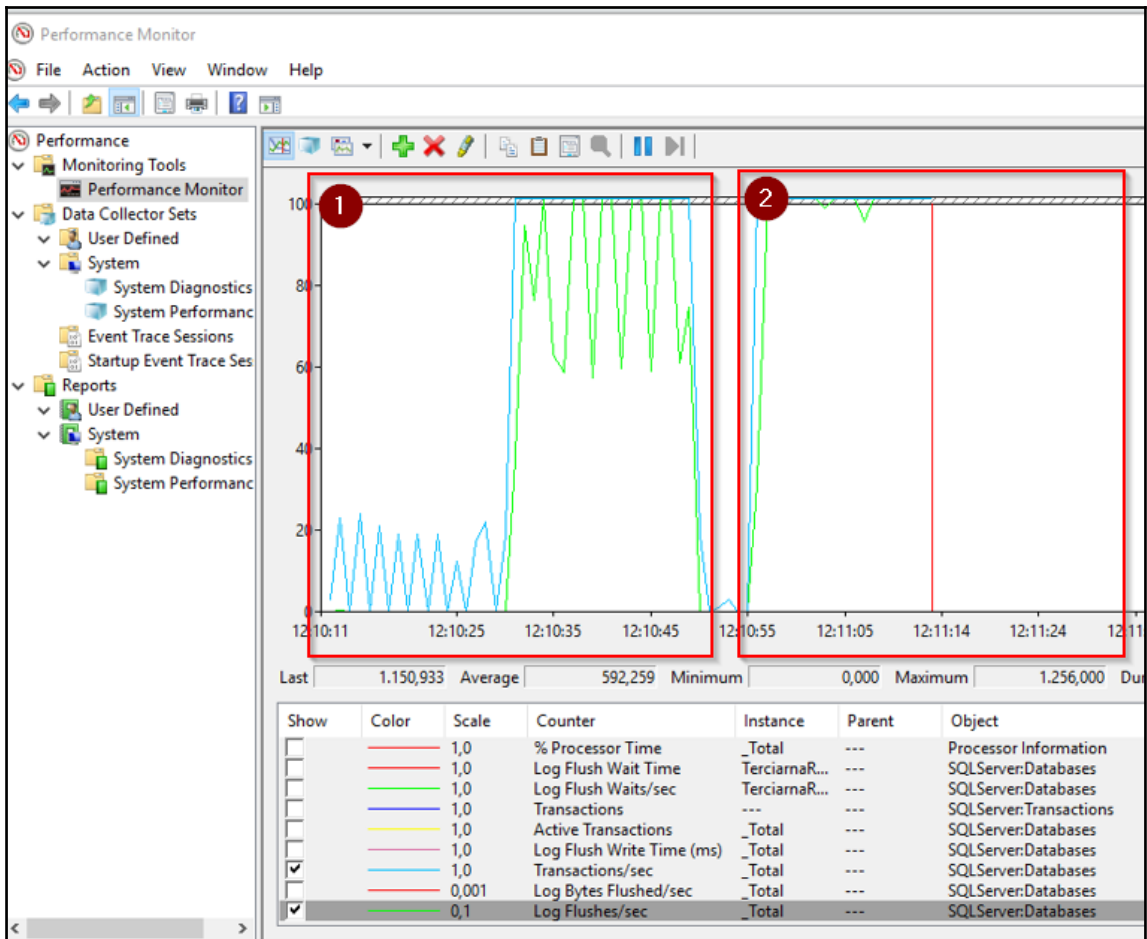
```
DECLARE @count INT = 0
DECLARE @start1 DATETIME = GETDATE()
WHILE (@count <= 250000)
    BEGIN
        BEGIN TRAN
            INSERT INTO TestDDTable(R_num, class)
VALUES(@count, 'WITHOUT_DD')
            SET @count += 1
        COMMIT
    END
```

Below the query editor are controls for "Parameter Substitution" and "Database". The "Number of Iterations" is set to 10, and the "Number of Threads" is also set to 10. On the right side, there are "GO" and "Cancel" buttons, a "Progress" bar, and several performance metrics displayed in green text on a black background:

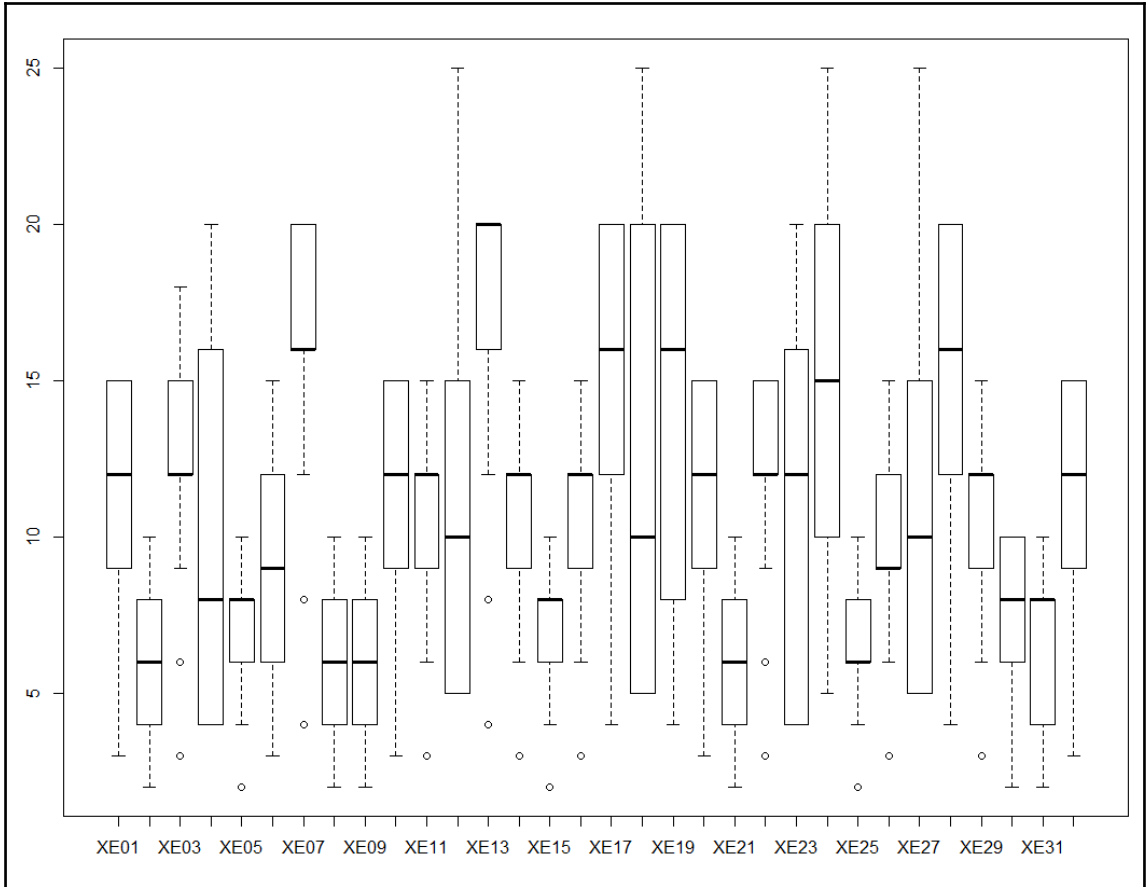
- Elapsed Time: 00:00:24.8367
- Iterations Completed: 0
- Client Seconds/Iteration (Avg): 0,0000
- Total Exceptions: 0
- CPU Seconds/Iteration (Avg): ---
- Actual Seconds/Iteration (Avg): ---
- Logical Reads/Iteration (Avg): ---



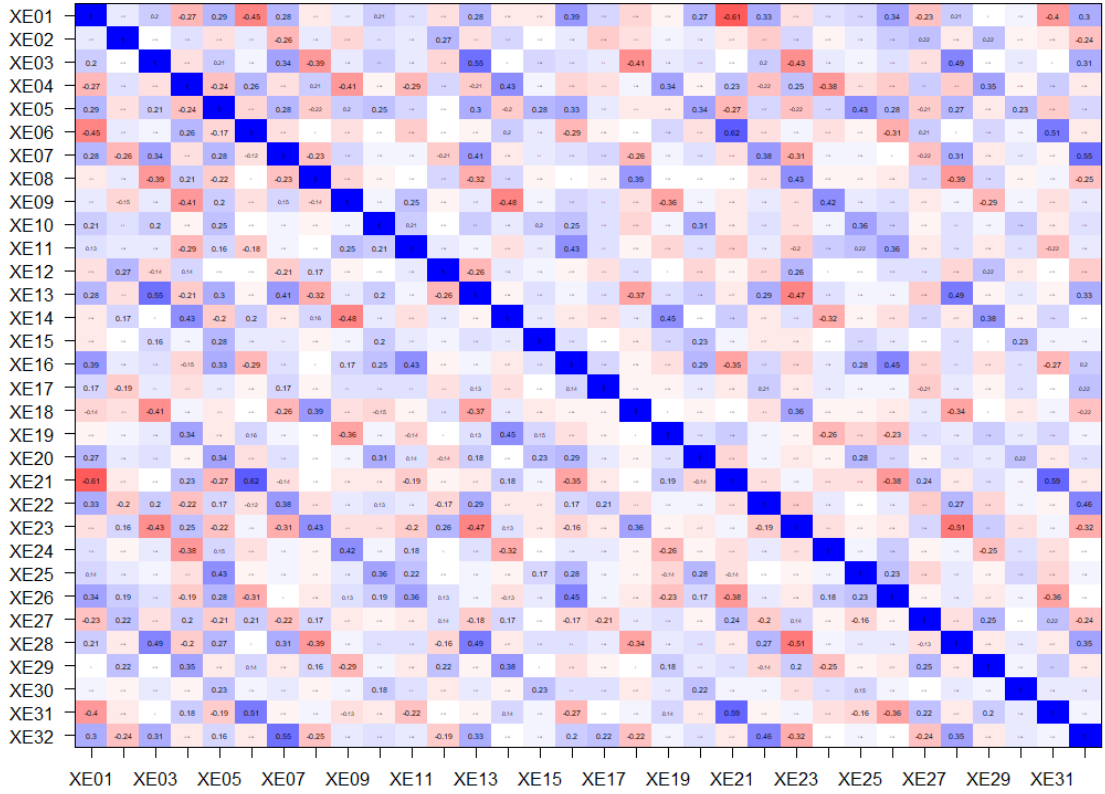




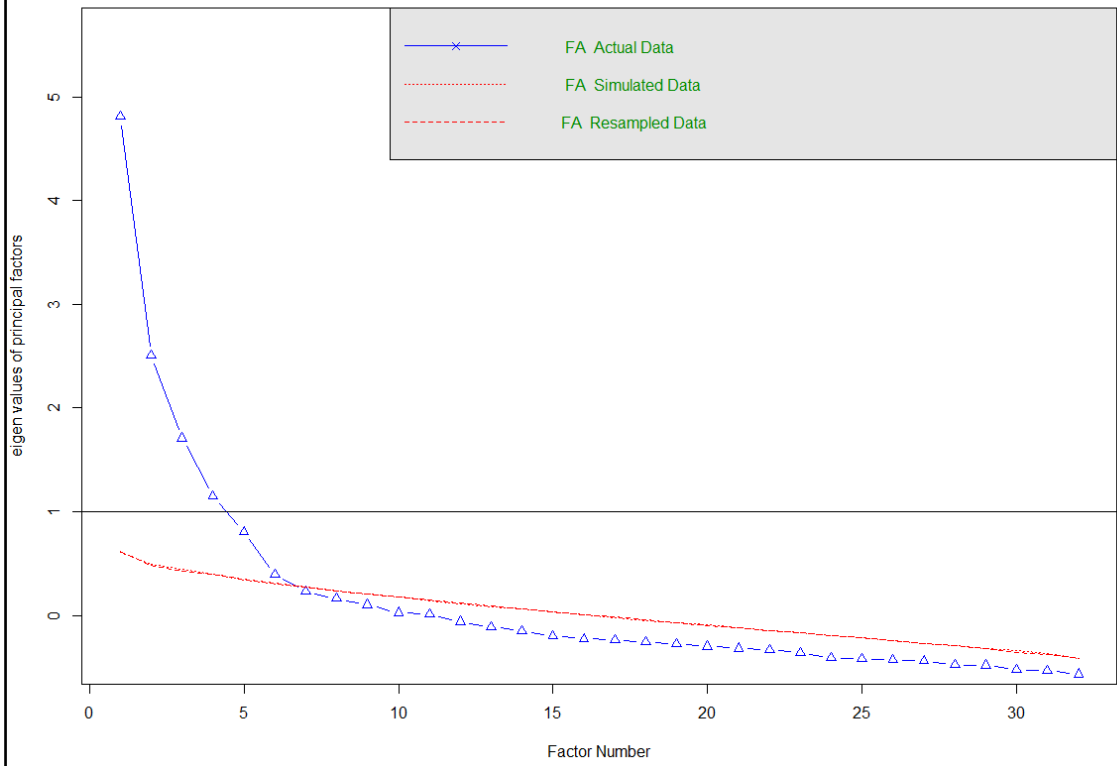
	XE01	XE02	XE03	XE04	XE05	XE06	XE07	XE08	XE09	XE10	XE11	XE12	XE13
1	15	8	15	4	8	9	12	2	4	9	6	20	20
2	3	2	15	8	2	6	20	2	10	3	15	15	20
3	12	2	15	12	6	12	20	6	2	12	6	5	20
4	12	4	15	4	8	9	16	8	8	15	12	5	16
5	6	6	15	4	4	12	20	4	6	9	12	10	20
6	3	2	15	16	6	12	16	4	2	12	9	15	20
7	9	4	15	4	4	3	4	4	10	12	12	5	20
8	15	4	12	8	8	3	16	6	6	15	12	5	16
9	15	2	12	12	4	3	16	8	4	9	12	5	16
10	12	2	15	4	8	9	16	2	10	12	15	5	20
11	15	6	15	4	6	3	16	4	8	15	9	5	12
12	12	8	12	20	4	9	20	10	4	12	6	20	16
13	12	10	15	12	6	12	16	2	6	12	12	5	20
14	15	10	15	16	8	6	16	8	10	12	12	5	20
15	12	8	15	8	8	12	16	2	4	12	12	20	20
16	12	4	6	12	6	12	16	4	2	6	6	5	20



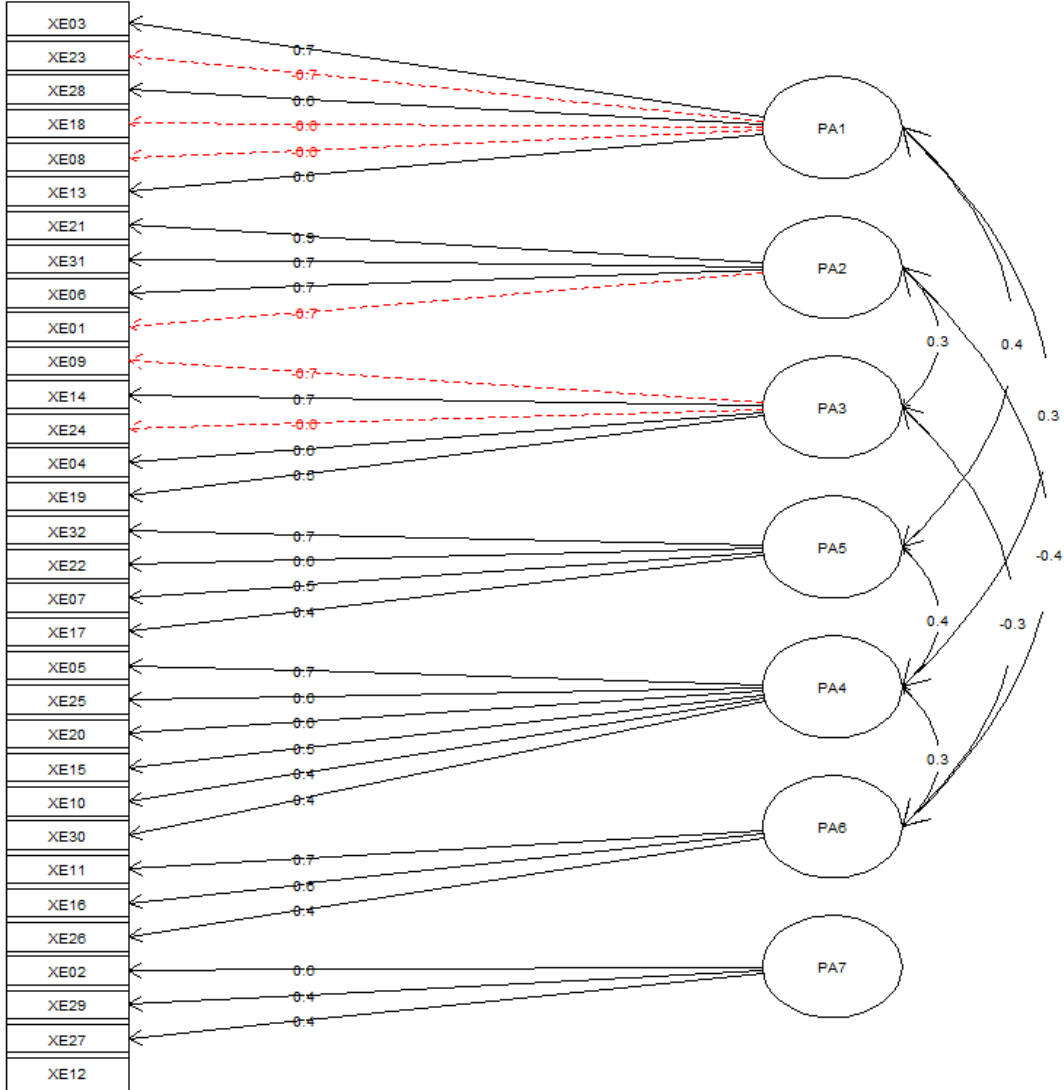
Server Features



Parallel Analysis Screen Plots



Factor Analysis



	PA1	PA2	PA3	PA4	PA5	PA6	PA7
1	0.156	-0.674	-0.045	0.322	0.138	0.066	0.344
2	0.028	-0.097	0.145	-0.479	0.035	0.192	0.354
3	0.680	0.010	0.005	0.154	0.142	0.037	0.122
4	-0.168	0.185	0.608	-0.161	-0.031	-0.091	0.027
5	0.204	-0.253	-0.193	0.117	0.631	-0.040	-0.108
6	0.055	0.679	0.153	-0.110	0.036	-0.079	0.060
7	0.352	-0.115	-0.003	0.538	0.103	-0.067	-0.029
8	-0.581	0.026	0.122	-0.057	-0.031	0.060	0.179
9	0.068	0.013	-0.662	0.105	0.076	0.104	-0.005
10	0.113	-0.043	0.028	0.061	0.468	0.199	0.176
11	0.051	-0.123	-0.225	0.014	0.183	0.581	-0.001
12	-0.150	-0.069	0.079	-0.376	-0.019	0.066	0.129
13	0.640	-0.061	-0.035	0.291	0.178	-0.141	0.144
14	-0.052	0.120	0.692	-0.065	-0.005	0.076	0.153
15	0.122	0.093	0.081	-0.043	0.450	0.025	-0.080
16	0.009	-0.331	-0.076	0.164	0.328	0.553	0.007
17	-0.003	-0.021	-0.097	0.376	0.083	0.077	0.026
18	-0.578	0.000	0.037	-0.013	-0.037	-0.051	-0.084
19	0.107	0.134	0.547	0.059	0.066	-0.106	0.066
20	0.042	-0.146	0.060	0.091	0.532	0.048	0.127

Add Counters

Available counters

Select counters from computer:

<Local computer> Browse...

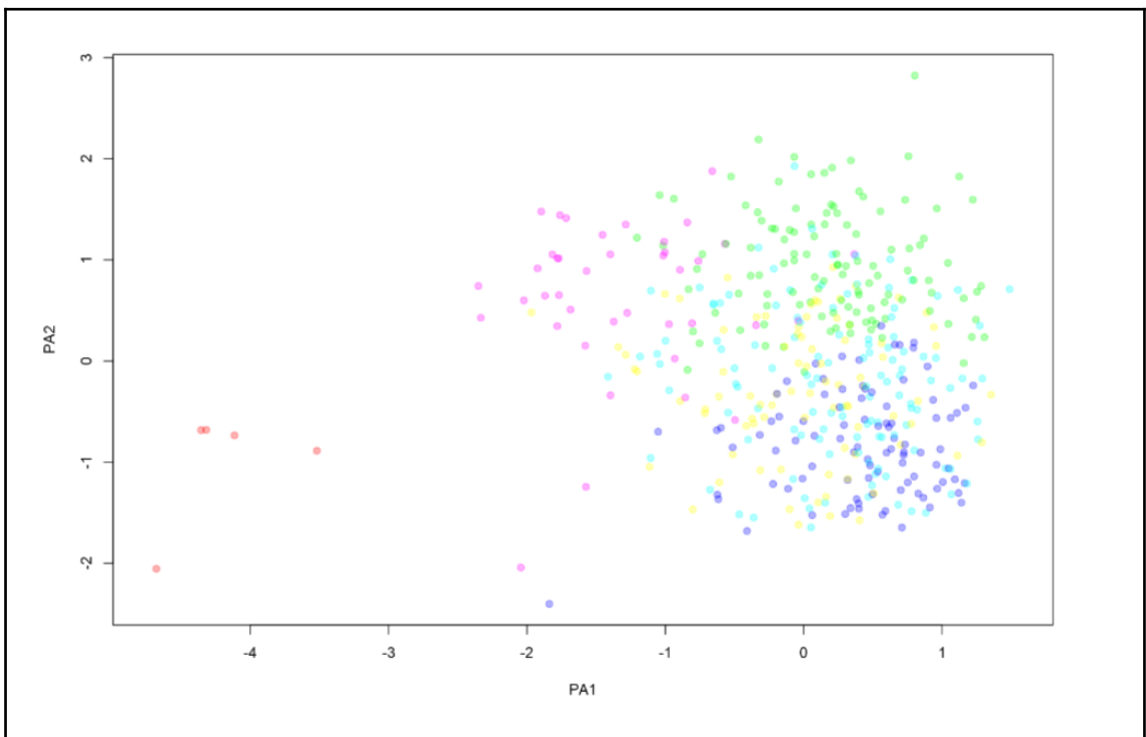
MSSQL\MSSQLSERVER2017:transactions

- Free Space in tempdb (KB)
- Longest Transaction Running Time
- NonSnapshot Version Transactions
- Snapshot Transactions
- Transactions
- Update conflict ratio
- Update Snapshot Transactions
- Version Cleanup rate (KB/s)

Instances of selected object:

Added counters

Counter	Parent	Inst...
MSSQL\MSSQLSERVER2017:Transactions		
Free Space in tempdb (KB)	---	---
Transactions	---	---
Longest Transaction Running Time	---	---
Update conflict ratio	---	---

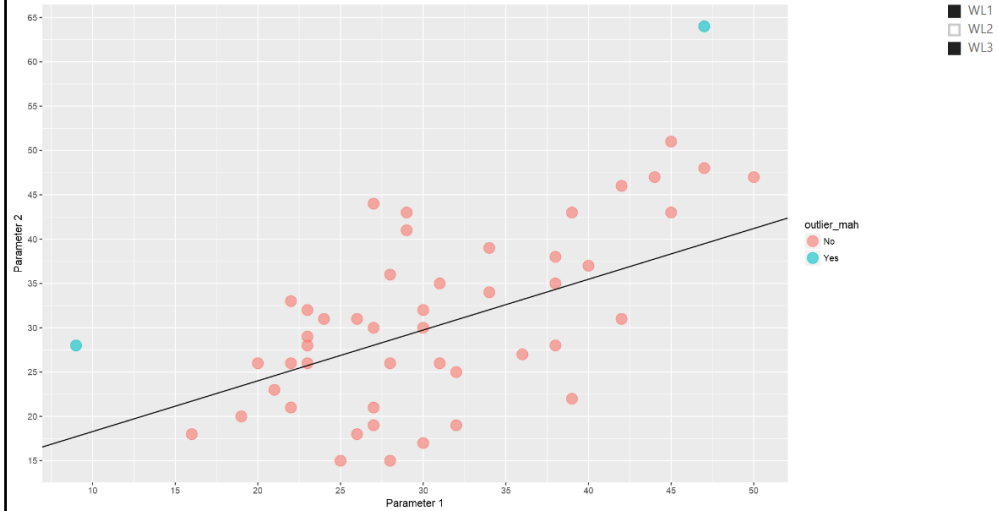


	WL_ID	Param1	Param2
1	WL1	39	43
2	WL1	28	36
3	WL1	26	31
4	WL1	16	18
5	WL1	23	29
6	WL1	40	37
7	WL1	38	38
8	WL1	42	46
9	WL1	23	28
10	WL1	22	21
11	WL1	38	35
12	WL1	31	26

Running statistics on the workloads; DBA provides data, Statistician provides the answers

WL_ID, Parameter1 and Parameter2

Mahalanobis distances for multivariate regression outliers
Comparison on 1 parameter for three synthetic Workloads



Type II MANOVA Tests:

Sum of squares and products for error:

	Parameter1	Parameter2
Parameter1	7140.827	5846.12
Parameter2	5846.120	9943.84

Term: WL_ID

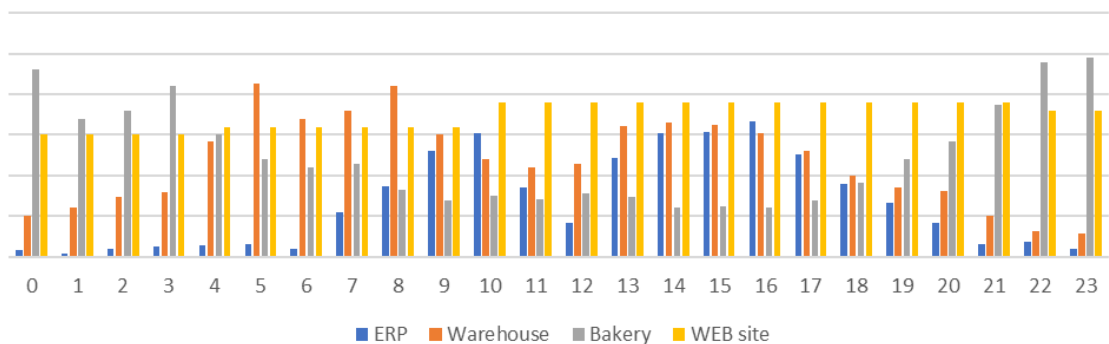
Sum of squares and products for the hypothesis:

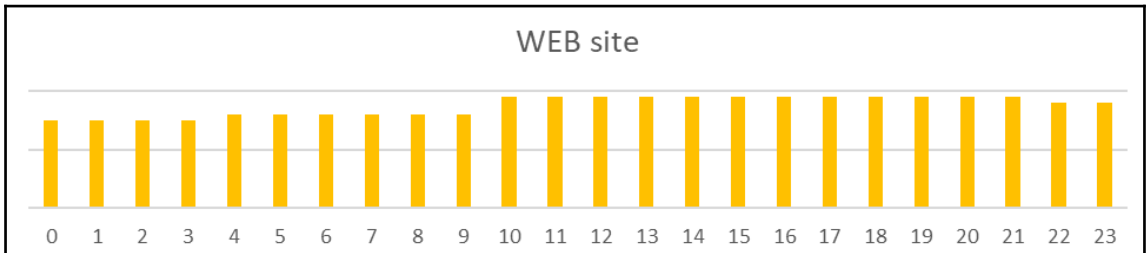
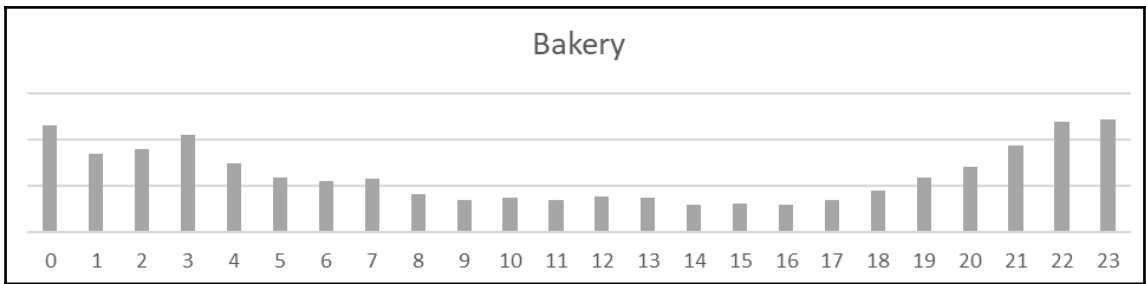
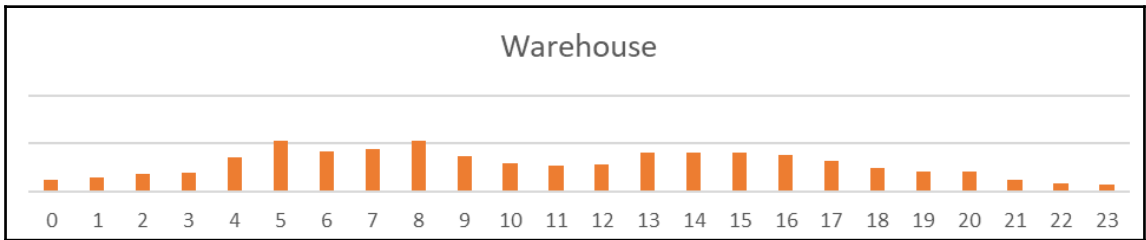
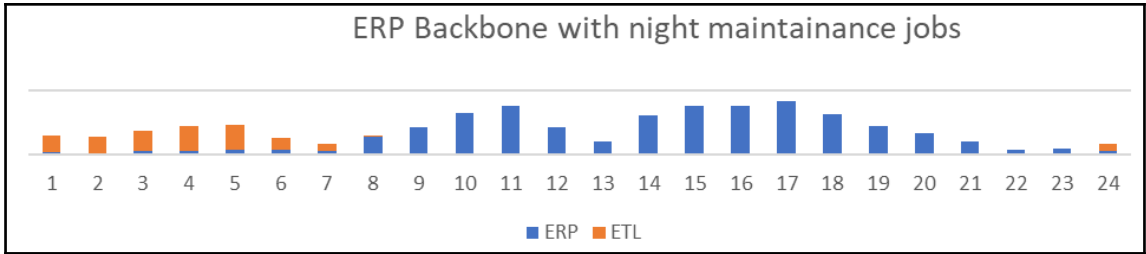
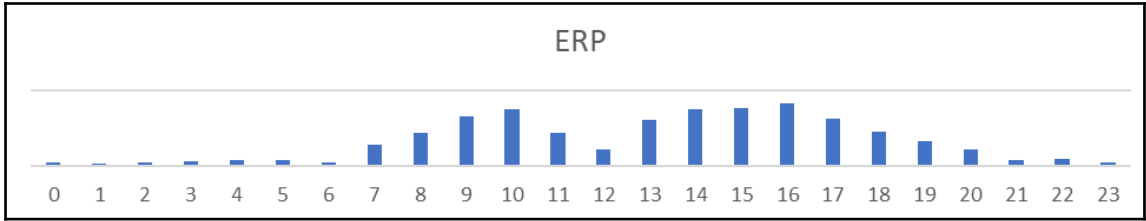
	Parameter1	Parameter2
Parameter1	42.32	149.04
Parameter2	149.04	524.88

Multivariate Tests: WL_ID

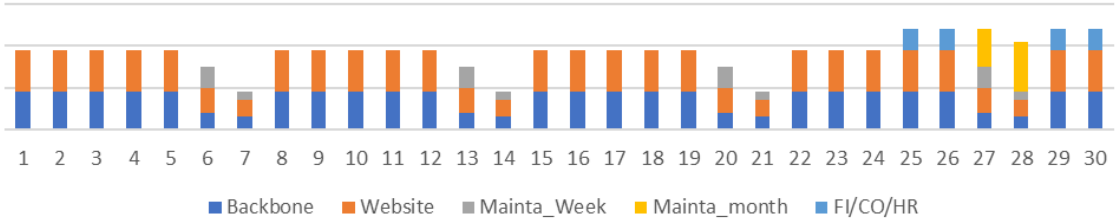
	Df	test stat	approx F	num Df	den Df	Pr(>F)
Pillai	1	0.0618062	2.371602	2	72	0.10058
wilks	1	0.9381938	2.371602	2	72	0.10058
Hotelling-Lawley	1	0.0658778	2.371602	2	72	0.10058
Roy	1	0.0658778	2.371602	2	72	0.10058

Database Request for different business vertical

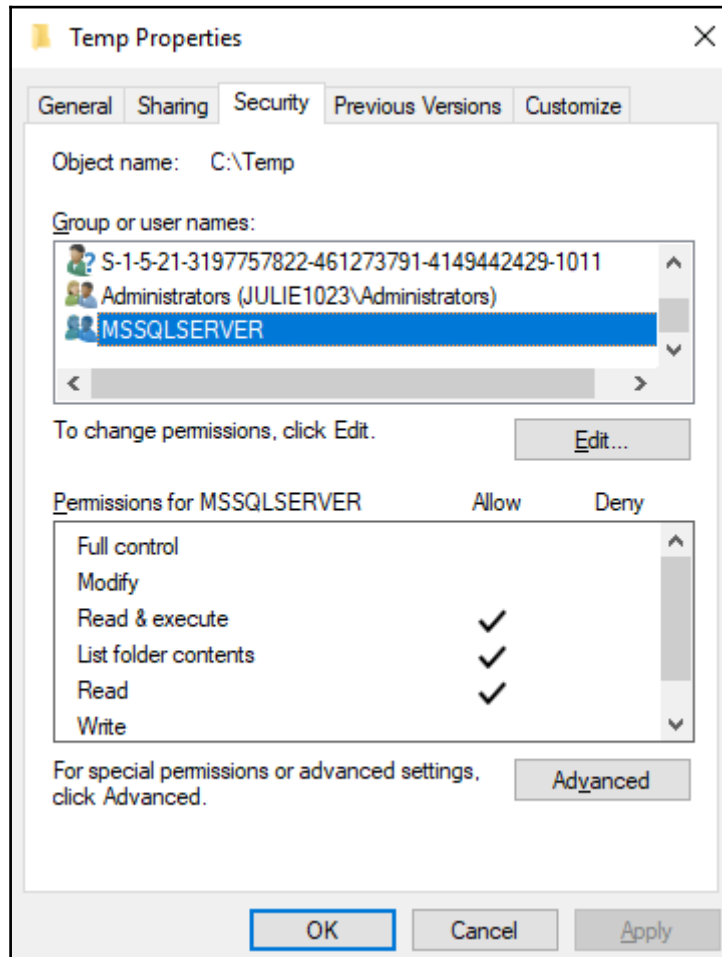


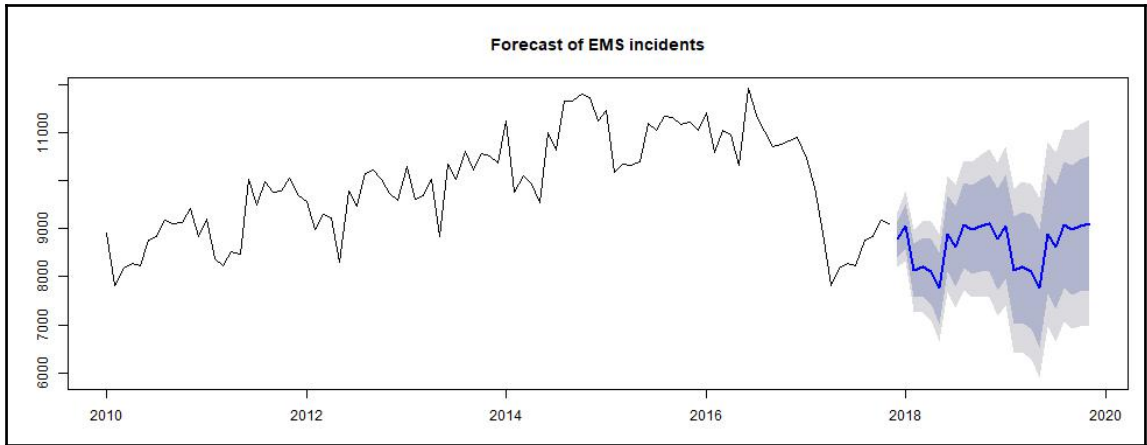


Monthly business cycle



Chapter 10: R and SQL Server 2016/2017 Features Extended





	Date	TotalIncidents	AustinIncidents	TravisIncidents
1	2010-10-01	8910	7571	1321
2	2010-11-01	7826	6564	1232
3	2010-12-01	8182	6858	1290
4	2011-01-01	8287	7081	1185
5	2011-02-01	8241	6969	1255
6	2011-03-01	8764	7449	1302
7	2011-04-01	8848	7506	1319
8	2011-05-01	9166	7704	1432
9	2011-06-01	9102	7743	1339
10	2011-07-01	9121	7762	1349

RESULTS

	plot
7	0xFFD8FFE000104A46494600010100000100010000FFDB...

MESSAGES

[3:23:56 PM] Started executing query at [Line 86](#)
(1 row affected)
Total execution time: 00:00:23.432

View as Chart

