



Data  
Migrators

MettleCI

DevOps for DataStage

© 2018-2019 Data Migrators Pty Ltd., All Rights Reserved





## Please Note

IBM's statements regarding its plans, directions, and intent are subject to change or withdrawal without notice and at IBM's sole discretion.

Information regarding potential future products is intended to outline our general product direction and it should not be relied on in making a purchasing decision.

The information mentioned regarding potential future products is not a commitment, promise, or legal obligation to deliver any material, code or functionality. Information about potential future products may not be incorporated into any contract.

The development, release, and timing of any future features or functionality described for our products remains at our sole discretion.

Performance is based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput or performance that any user will experience will vary depending upon many factors, including considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve results similar to those stated here.

# CI/CD & Migration Updates

- **MettleCI OEM almost finalized**

- Clients who trade-up or upgrade to DataStage or Information Server for Cloud Pak for Data, or buy net new licenses, will be entitled to use MettleCI at **no additional charge**
  - Migration to Cloud Pak for Data
  - CI/CD capability on existing entitlement (for modernization licenses) and on Cloud Pak for Data

# Welcome to MettleCI

—

The first 3 principles of the Agile Manifesto

“Our highest priority is to satisfy the customer through **early and continuous delivery** of valuable software. “

“**Welcome changing requirements**, even late in development. Agile processes harness change for the customer's competitive advantage.”

“**Deliver working software frequently**, from a couple of weeks to a couple of months, with a preference to the shorter timescale.”



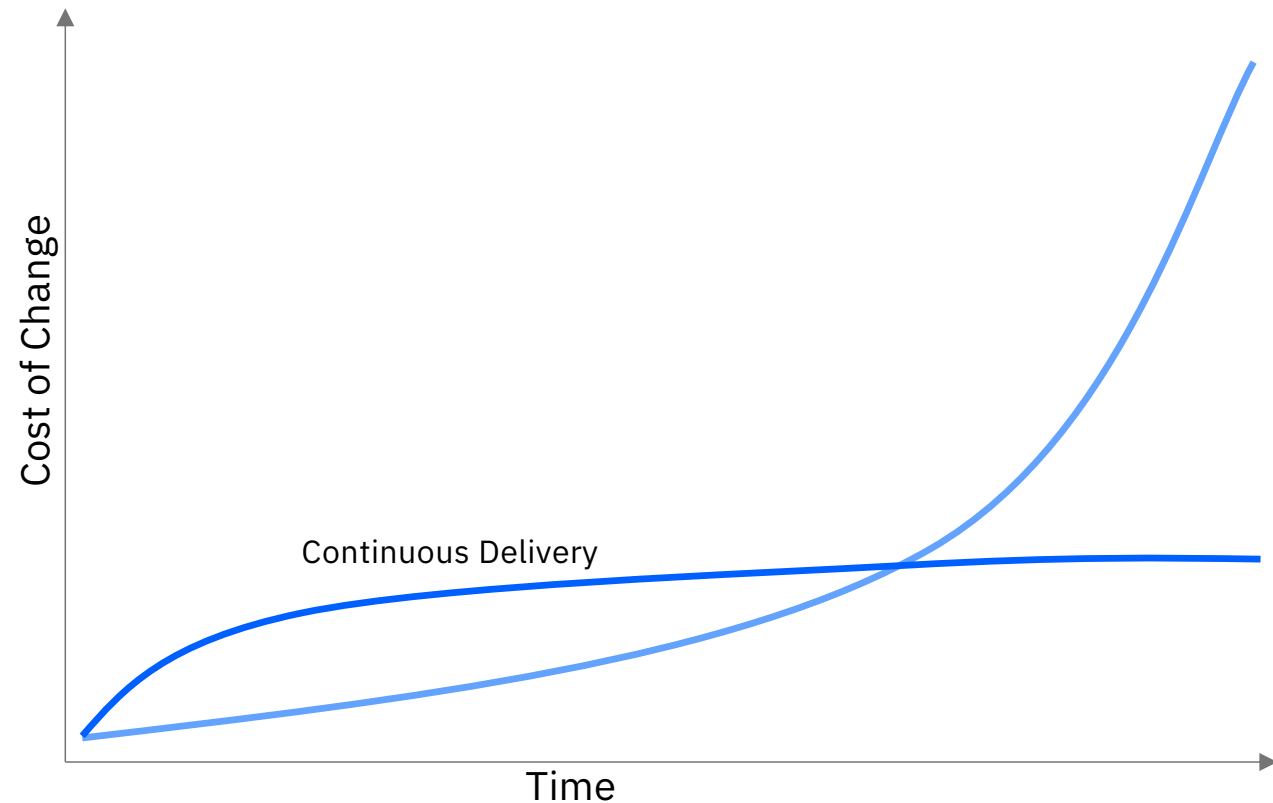
# The problem

## Agile Methodologies

- Continuous feedback
- Embrace (inevitable) change
- Frequent delivery

How do we flatten the cost of change?

- Small, frequent changes
- Reduce the feedback loop



# MettleCI for DevOps

## Accelerate your Software Delivery Lifecycle

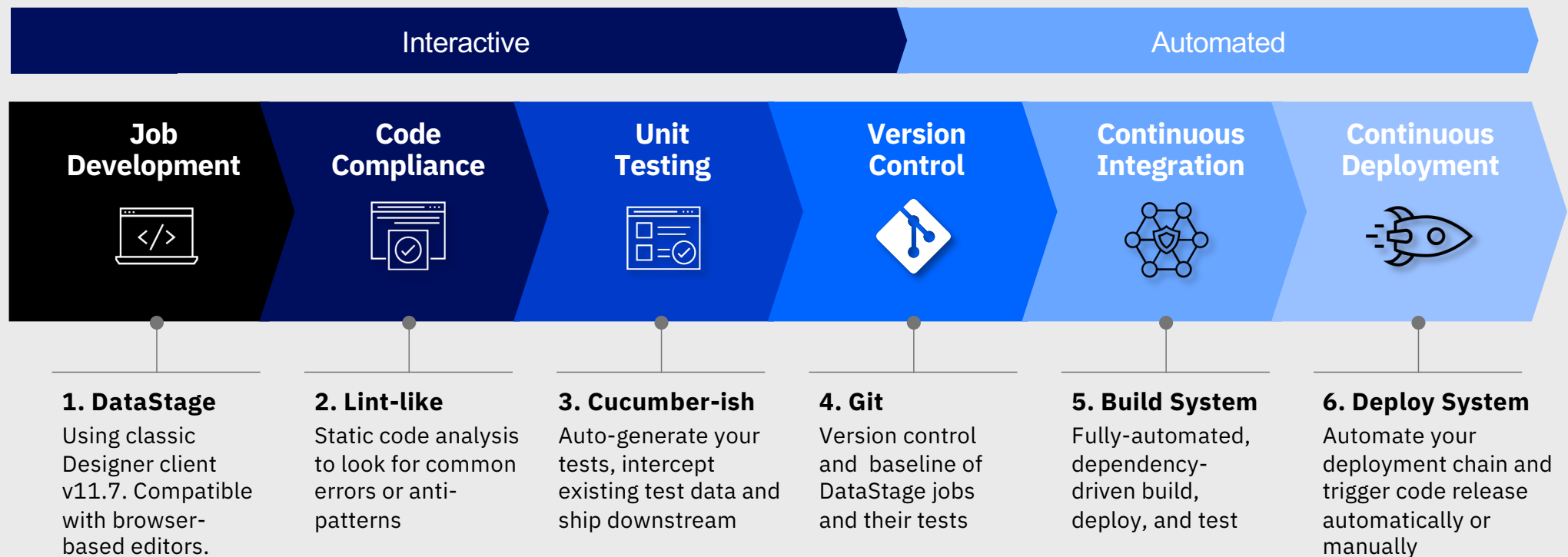
## **MettleCI Benefits**

- Shorter time to delivery
- Lower cost of maintenance
- Higher performance Jobs
- Earlier, cheaper defect discovery
- Lower testing costs
- More reliable E2E execution
- Zero-effort work item traceability / auditability
- Release management with minimal effort
- Visibly more productive DataStage teams
- Higher utilisation of Information Server platform
- Demonstrable alignment with organisation strategy

## **MettleCI Features & Functions**

- Automated Peer Review (Compliance)
- Automated Unit Testing (generation & management)
- Universal Git integration (Jobs and Unit Tests)
- Continuous Integration
- Continuous Delivery

# An Idealized Automated Delivery Pipeline



# Unit Test Specification

## Cucumber-like test specifications

File Edit View Repository Diagram Debug Import Export Tools Window Help

Data Set Management

- Advanced Find...
- Configurations...
- Message Handler Manager ...
- JCL Templates...
- Reporting Console...
- Run Director
- Multiple Job Compile
- Custom

Repository

mci\_demo\_develop

Open quick find

- mci\_demo\_develop
  - Data Elements
  - IMS Databases (DBD)
  - IMS Viewsets (PSB/PCB)
  - Jobs
    - Extract
      - EX\_GENERIC\_INITIAL\_DB\_IM
      - EX\_BIS\_ATT\_
      - EX\_BIS\_GL\_B
      - EX\_DATAVAU
      - EX\_GENERIC
      - EX\_GENERIC
      - EX\_GENERIC
      - EX\_POLK
      - EX\_TOS\_ACCO
      - EX\_TOS\_CSI
      - EX\_TOS\_CSI
      - EX\_TOS\_FTO
      - EX\_TOS\_GAN
      - EX\_TOS\_IMAGES\_GROUPS
    - Global Rules
    - Load
    - Parameter Sets
    - Reference
    - Routines
    - Shared Containers
    - Transform

Unit Test Specification

Unit Test Spec

Unit Test Result

Check Compliance

Check In Asset

Customize...

dsINV\_CURRENCY

txUS tringToString

refCurrency: 0 rows, 0 rows/sec

ftlIND

sfB ISIndValues: 0 rows, 0 rows/sec

AccountsWithND: 0 rows, 0 rows/sec

luCurrency

AccountsWithCurr: 0 rows, 0 rows/sec

txCheckAndTx

outTransform: 0 rows, 0 rows/sec

dsTR\_ACC\_ACCOUNTS\_Debtors

inAccounts: 0 rows, 0 rows/sec

txSetLookupValues

lnkPopulateValues: 0 rows, 0 rows/sec

luBISIndValues

dropNoIND001: 0 rows, 0 rows/sec

cpNoIND

DSLinkIS: 0 rows, 0 rows/sec

soDisNoIND

TR\_ACC\_ACCOUNTS\_Debtors

Displaying 88 Entries.

Type	Occurred	Event
	1/22/2019 2:54:15 ...	main_program: The open files limit is 1024; raising to 4096.
	1/22/2019 2:54:15 ...	main_program: conductor uname: -s=Linux; -r=3.10.0-514.26.2.el7.x86_64; -v=#1 SMP Fri Jun 30 05:26:04 UTC 2017; -n=demo1-engn.datamigrators.i...
	1/22/2019 2:54:15 ...	main_program: orchgeneral: loaded ...
	1/22/2019 2:54:17 ...	main_program: APT configuration file: /data/project/mci_demo_develop/config/default.apt ...
	1/22/2019 2:54:17 ...	scDisNoIND.sfdiscards,0: Export complete; 0 records exported successfully, 0 rejected.
	1/22/2019 2:54:17 ...	dsGR_ACCOUNTS_Debtors: Unit Test report(s) available: ...
	1/22/2019 2:54:17 ...	main_program: Step execution finished with status = OK.
	1/22/2019 2:54:17 ...	main_program: Startup time, 0:00; production run time, 0:00.
	1/22/2019 2:54:22 ...	Parallel job reports successful completion
	1/22/2019 2:54:28 ...	Finished Job TR_ACC_ACCOUNTS_Debtors.



Job name

TR\_ACC\_ACCOUNTS\_Debtors



Test specification

SPECIFICATION



test1.yaml

DATA



accounts.csv

IN

currencies.csv

IN

ind\_values.csv

IN

acc\_accounts\_debtors1.csv

OUT

acc\_accounts\_debtors.csv

```
given:
- stage: dsGR_ACCOUNTS_Debtors
  link: inAccounts
  path: accounts.csv

- stage: dsEX_BIS_Metadata_IND_Values
  link: BISIndValues
  path: ind_values.csv

- stage: dsINV_CURRENCIES
  link: Currency
  path: currencies.csv

when:
  job: TR_ACC_ACCOUNTS_Debtors
  parameters:
    pGlobal.MigrationDate: 2018-04-27 10:33:24
    pAudit.JobName: GR_ACCOUNTS_Debtors

then:
- stage: dsTR_ACC_ACCOUNTS_Debtors
  link: outTransform
  path: acc_accounts_debtors1.csv
```

Cucumber-like YAML

## TR\_ACC\_ACCOUNTS\_Debtors

## SPECIFICATION

test1.yaml

## DATA

accounts.csv

IN

currencies.csv

IN

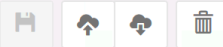
ind\_values.csv

IN

acc\_accounts\_debtors1.csv

OUT

acc\_accounts\_debtors.csv



```
given:
- stage: dsGR_ACCOUNTS_Debtors
  link: inAccounts
  path: accounts.csv

- stage: dsEX_BIS_Metadata_IND_Values
  link: BISIndValues
  path: ind_values.csv

- stage: dsINV_CURRENCIES
  link: Currency
  path: currencies.csv

when:
  job: TR_ACC_ACCOUNTS_Debtors
  parameters:
    pGlobal.MigrationDate: 2018-04-27 10:33:24
    pAudit.JobName: GR_ACCOUNTS_Debtors

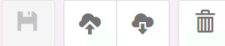
then:
- stage: dsTR_ACC_ACCOUNTS_Debtors
  link: outTransform
  path: acc_accounts_debtors1.csv
```

GIVEN (Input data)

WHEN (Test conditions)

THEN (Success criteria)

## TR\_ACC\_ACCOUNTS\_Debtors



1



## SPECIFICATION



test1.yaml

## DATA



accounts.csv

IN

currencies.csv

IN

ind\_values.csv

IN

acc\_accounts\_debtors1.csv

OUT

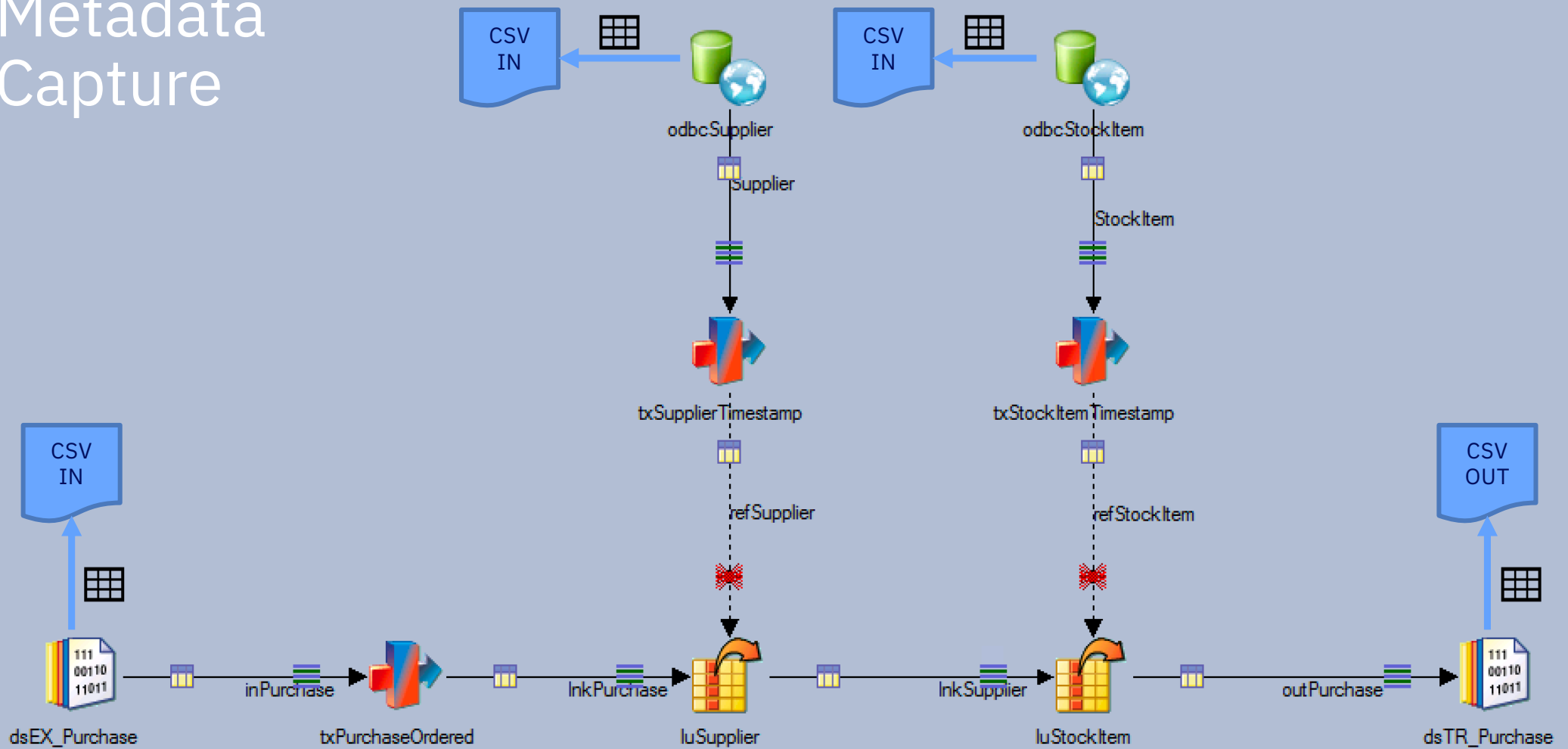
acc\_accounts\_debtors.csv

	FKKVKP_PARTNER	FKKVKP_VKONT	FKKVKP_ERDAT	FKKVKP_ERNAM	FKKVKP_AEDATP	FKKVKP_AENAMP
1	1234567890	098765432112	2018-02-16	admin	2018-03-03	user
2	2558765257	052475432239	2018-01-11	admin	2018-02-17	user
3	8127739201	388237364920	2018-03-27	admin	2018-05-01	user
4	7216678927	746919274937	2017-03-27	admin	2017-05-01	user

Edit test data  
just like Excel

Parallel

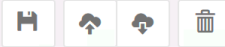
# Metadata Capture



# Data Fabrication

## Automated data generation

## TR\_ACC\_ACCOUNTS\_Debtors



1



## SPECIFICATION



test1.yaml

## DATA



accounts.csv

IN

currencies.csv

IN

ind\_values.csv

IN

acc\_accounts\_debtors1.csv

OUT

acc\_accounts\_debtors.csv

MyFabricatedData.csv

	column1  string	column2 
1	value1	value2



Column Name

column1

Column Type

string

string

cstring

date

time

timestamp

decimal

dfloat

int16

int32

int64

int8

sfloat

uint16

uint32

uint64

uint8

raw

DataStage native datatypes

## Column Name

cust\_forename



## Column Type

string

## length

30



## Fabrication Type

name.firstName

**name.firstName**  
**name.lastName**  
**name.findName**  
**name.jobTitle**  
**name.prefix**  
**name.suffix**  
**name.title**  
**name.jobDescriptor**  
**name.jobArea**  
**name.jobType**  
**address.streetName**

Name search for  
fabrication algorithms

~200 data fabrication algorithms  
Create your own in JavaScript

Column Name

column1

Column Type

int16

Fabrication Type

random.number

min

1

max

10

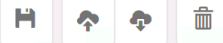
precision

Each fabrication algorithm  
offers customization options

Close

Update

TR\_ACC\_ACCOUNTS\_Debtors



Add as many test data rows as you need

10



## SPECIFICATION



test1.yaml

## DATA



accounts.csv

IN

currencies.csv

IN

ind\_values.csv

IN

acc\_accounts\_debtors1.csv

OUT

MyFabricatedData.csv

acc\_accounts\_debtors.csv

	cust_id	cust_forename	cust_surname	cust_street
1	87	Odie	Gorczyany	2738 Eryn Dam Apt. 928
2	36	Dewayne	Dibbert	55101 Funk Hills Apt. 277
3	21	Electa	Gerlach	04198 John Valleys Apt. 546
4	24	Kristy	Eichmann	0834 Kirstin Pines Apt. 647
5	60	Dayana	O'Kon	994 Kaitlyn Lodge Apt. 536
6	20	Baby	Borer	67149 Elnora Cliffs Apt. 591
7	91	Therese	Grant	78243 Kihn Garden Apt. 261
8	63	Emil	Parisian	30806 Kamren Park Suite 255
9	70	Josie	Jones	63258 Weissnat Fort Apt. 514
10	75	Selena	Nitzsche	5795 Witting Springs Apt. 771
11	49	Amina	Johnston	17582 Haag Freeway Suite 512

TR\_ACC\_ACCOUNTS\_Debtors



10



## SPECIFICATION

test1.yaml

## DATA

accounts.csv

IN

currencies.csv

IN

ind\_values.csv

IN

acc\_accounts\_debtors1.csv

OUT

MyFabricatedData.csv

acc\_accounts\_debtors.csv

Export your file to manage it or collaborate using external tools such as Microsoft Excel.

Opening MyFabricatedData.csv

You have chosen to open:

**MyFabricatedData.csv**

which is: TXT file (575 bytes)

from: blob:

## What should Firefox do with this file?

☐ Open with Notepad++ : a free (GNU) source code editor (...)☒ Save File☐ Do this automatically for files like this from now on.

OK

Cancel

cust_surname	cust_street
	2738 Eryn Dam Apt. 928
	55101 Funk Hills Apt. 277
	04198 John Valleys Apt. 546
	0834 Kirstin Pines Apt. 647
	994 Kaitlyn Lodge Apt. 536
	67149 Elnora Cliffs Apt. 591
	78243 Kihn Garden Apt. 261
	30806 Kamren Park Suite 255
	63258 Weissnat Fort Apt. 514
	5795 Witting Springs Apt. 771
	17582 Haag Freeway Suite 512

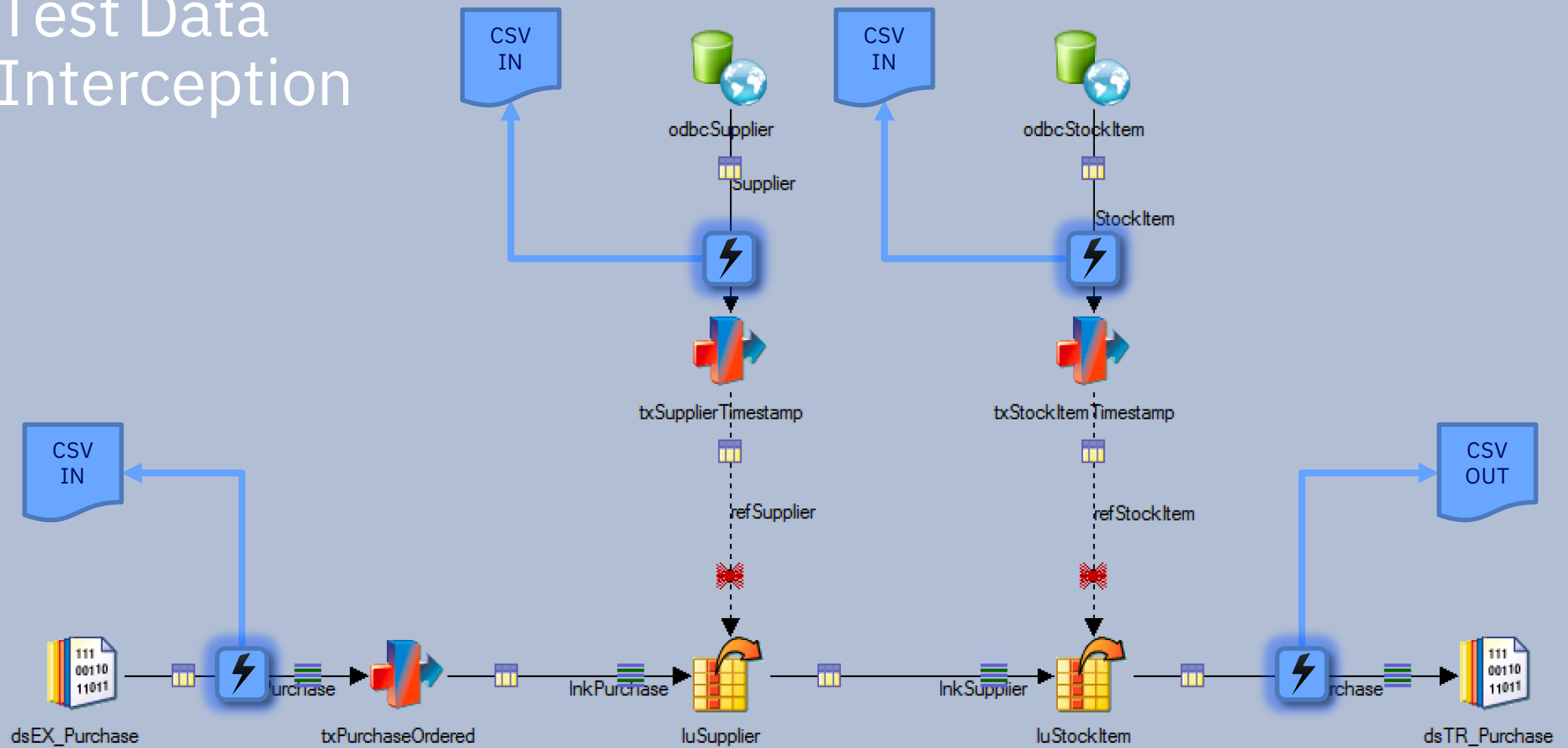
# Automated Unit Tests

## Run tests from DataStage Designer



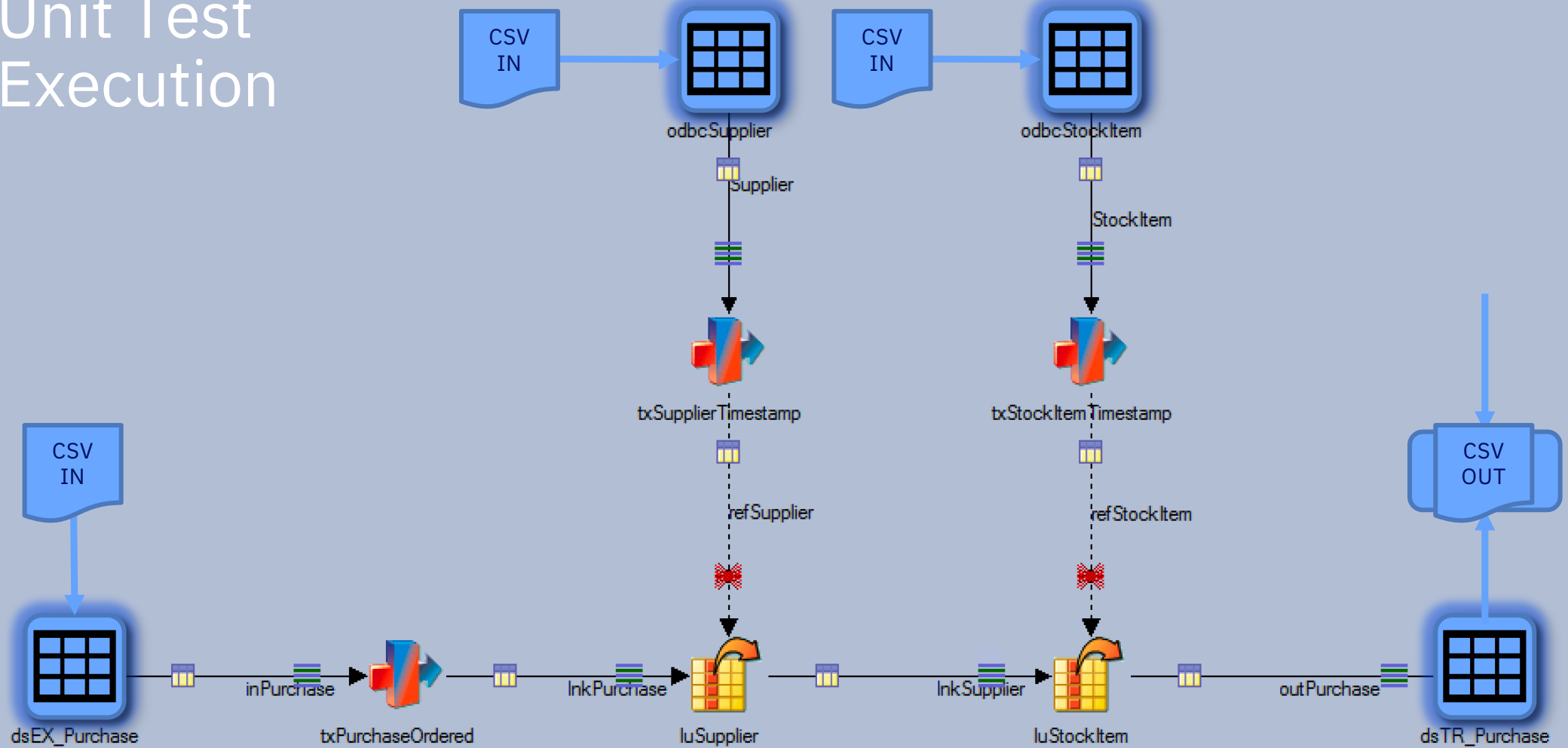
Parallel

# Test Data Interception



Parallel

# Unit Test Execution



IBM InfoSphere DataStage and QualityStage Designer

File Edit View Repository Diagram Debug Import Export Tools Window Help

Repository: wwi\_devops\_develop

TR\_ORDERS - Job Run Options

Parameters | Limits | General

Name	Value
Unit Testing Config	Disabled
pGlobal parameters	Intercept
Dataset Directory	Test
pDMSqlServer_DW	wwi_dw_develop
Data Source Name	wwi_dw_develop
User Name	admin
Password	*****
Database Vendor	MSSQL Server

Workload management

Queue: Project default (MediumPriorityJobs)

Run Validate Cancel Help

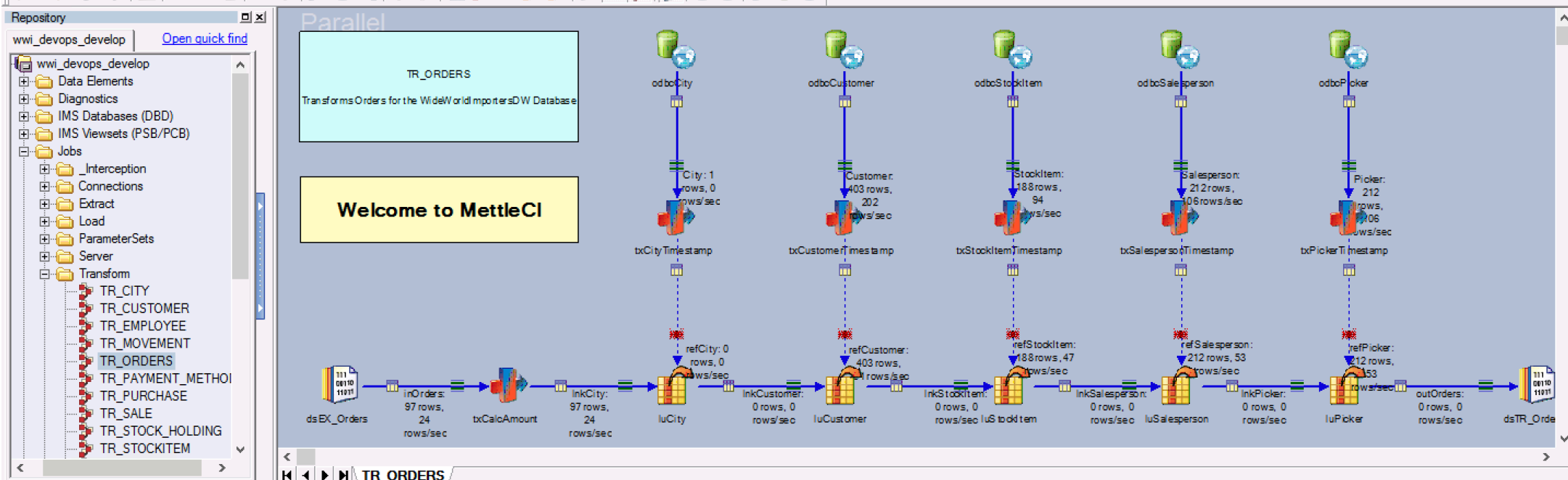
Unit Test modes are:  
**Test** – Run a unit test  
**Intercept** – Capture test data  
**Disabled** – Run the job as normal

Diagram showing data flow from odbcCustomer, odbcStockItem, odbcSalesperson, and odbcPicker to various intermediate steps (luCustomer, luStockItem, luSalesperson, luPicker) and finally to outOrders and dsTR\_Order.

Log View

Displaying 104 Entries.

Type	Occurred	Event
	15/05/2020 6:51:23...	main_program: HV000001: Hibernate Validator null
	15/05/2020 6:51:23...	main_program: IBM InfoSphere DataStage Enterprise Edition 11.5.0.8169 ...
	15/05/2020 6:51:23...	main_program: The open files limit is 1024; raising to 4096.
	15/05/2020 6:51:23...	main_program: conductor uname: -s=Linux; -r=3.10.0-514.26.2.el7.x86_64; -v=#1 SMP Fri Jun 30 05:26:04 UTC 2017; -n=demo1-engn.datamigrators.i...
	15/05/2020 6:51:23...	main_program: orchgeneral: loaded ...
	15/05/2020 6:51:23...	main_program: APT configuration file: /data/project/wwi_devops_develop/config/default.apt ...
	15/05/2020 6:51:27...	main_program: This step has 29 datasets: ...
	15/05/2020 6:51:27...	Testing.Report,0: Unit Test report(s) available: ...
	15/05/2020 6:51:27...	main_program: Step execution finished with status = OK.
	15/05/2020 6:51:27...	main_program: Startup time, 0:01; production run time, 0:03.
	15/05/2020 6:51:32...	Parallel job reports successful completion
	15/05/2020 6:51:38...	Finished Job TR_ORDERS.



Type	Occurred	Event
	15/05/2020 11:19:1...	Starting Job TR_ORDERS. ...
	15/05/2020 11:19:1...	Environment variable settings: ...
	15/05/2020 11:19:1...	Parallel job initiated
	15/05/2020 11:19:1...	OSH script ...
	15/05/2020 11:19:1...	Parallel job default NLS map UTF-8, default locale OFF
Warning	15/05/2020 11:19:1...	main_program: Data Migrators - Unit Interception Enabled
	15/05/2020 11:19:1...	main_program: Loading OSH
Warning	15/05/2020 11:19:1...	main_program: Data Migrators - Unit Interception Enabled
	15/05/2020 11:19:1...	main_program: IBM InfoSphere DataStage Enterprise Edition 11.5.0.8169 ...
	15/05/2020 11:19:1...	main_program: The open files limit is 1024; raising to 4096.

Unit Test data interception produces a job log warning



NAVIGATION

Unit Test

Compliance

Version Control

wwi\_devops\_develop



John Mckeever

TR\_ORDERS



1 +

SPECIFICATION



TR\_ORDERS

DATA



dsEX\_Orders-inOrders

IN

odbcCity-City

IN

odbcCustomer-Customer

IN

odbcPicker-Picker

IN

odbcSalesperson-Salesperson

IN

odbcStockItem-StockItem

IN

dsTR\_Orders-outOrders

OUT

Your Unit Test data is intercepted 'in flight' during job execution and stored in the Unit Test CSV files

	PickingCompletedWhen	LastEditedWhen	OrderDate	OrderID	BackorderOrderID	
1	2013-01-01 11:00:00.0	2013-01-01 12:00:00.0	2013-01-01	2	46	USB food flash driv
2	2013-01-01 11:00:00.0	2013-01-01 12:00:00.0	2013-01-01	7	49	Developer joke mu
3	2013-01-02 11:00:00.0	2013-01-02 11:00:00.0	2013-01-01	53	(null)	Halloween skull ma
4	2013-01-01 11:00:00.0	2013-01-01 12:00:00.0	2013-01-01	16	57	Superhero action ja
5	2013-01-02 11:00:00.0	2013-01-02 11:00:00.0	2013-01-01	60	(null)	10 mm Anti static b
6	2013-01-01 11:00:00.0	2013-01-01 11:00:00.0	2013-01-01	26	(null)	Ride on toy sedan c
7	2013-01-01 11:00:00.0	2013-01-01 12:00:00.0	2013-01-01	30	67	20 mm Anti static b
8	2013-01-02 11:00:00.0	2013-01-02 11:00:00.0	2013-01-01	71	(null)	Superhero action ja
9	2013-01-01 11:00:00.0	2013-01-01 12:00:00.0	2013-01-01	39	74	Animal with big fee
10	2013-01-02 11:00:00.0	2013-01-02 11:00:00.0	2013-01-01	78	(null)	10 mm Anti static b
11	2013-01-02 11:00:00.0	2013-01-02 11:00:00.0	2013-01-02	83	(null)	DBA joke mug - twc
12	2013-01-03 11:00:00.0	2013-01-03 11:00:00.0	2013-01-02	134	(null)	Clear packaging tap
13	2013-01-02 11:00:00.0	2013-01-02 12:00:00.0	2013-01-02	94	135	Dinosaur battery-p
14	2013-01-02 11:00:00.0	2013-01-02 12:00:00.0	2013-01-02	98	137	DBA joke mug - daa
15	2013-01-03 11:00:00.0	2013-01-03 11:00:00.0	2013-01-02	102	(null)	The Gu red shirt XM
16	2013-01-02 11:00:00.0	2013-01-02 12:00:00.0	2013-01-02	107	142	The Gu red shirt XM
17	2013-01-02 11:00:00.0	2013-01-02 12:00:00.0	2013-01-02	112	145	Developer joke mu
18	2013-01-02 11:00:00.0	2013-01-02 11:00:00.0	2013-01-02	116	(null)	DBA joke mug - mir
19	2013-01-02 11:00:00.0	2013-01-02 11:00:00.0	2013-01-02	122	(null)	Superhero action ja
20	2013-01-03 11:00:00.0	2013-01-03 11:00:00.0	2013-01-02	152	(null)	Small 9mm replace
21	2013-01-02 11:00:00.0	2013-01-02 12:00:00.0	2013-01-02	130	153	RC toy sedan car w
22	2013-01-03 11:00:00.0	2013-01-03 11:00:00.0	2013-01-03	159	(null)	IT joke mug - hardv
23	2013-01-03 11:00:00.0	2013-01-03 12:00:00.0	2013-01-03	164	216	20 mm Anti static b
24	2013-01-03 11:00:00.0	2013-01-03 11:00:00.0	2013-01-03	167	(null)	Developer ioke mu

File Edit View Repository Diagram Debug Import Export Tools Window Help

Repository: mci\_demo\_develop [Open quick find](#)

TR\_ACC\_ACCOUNTS\_Debtors - Job Run Options

Parameters | Limits | General

Name	Value
pUnit Testing param	(As pre-defined)
Enable Data Migr	Disabled
pAudit parameters	Enabled
Job Name	(As pre-defined)
Invocation Id	
pGlobal parameters	(As pre-defined)
ID of the Batch	-1
Landin Directory	

Workload management

Queue: Project default (MediumPriorityJobs)

Run Validate Cancel Help

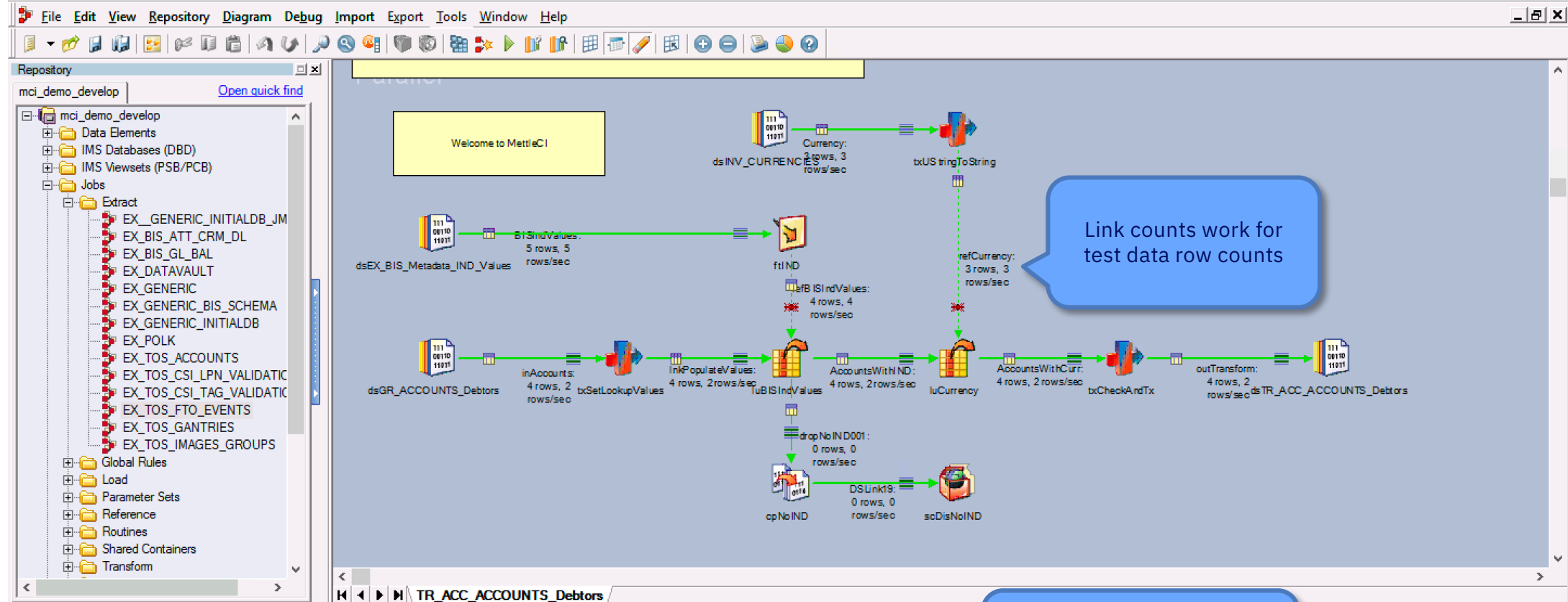
Unit tests are invoked by adding the 'Unit Testing' job parameter and setting it to 'Enabled'

Diagram components: Currency, txUS tringToString, AccountsWithND, luCurrency, AccountsWithCurr, txCheckAndTx, outTransform, dsTR\_ACC\_ACCOUNTS\_Debtors, dropNoIND001, cpNoIND, DSLinkIS, soDisNoIND

Displaying 88 Entries.

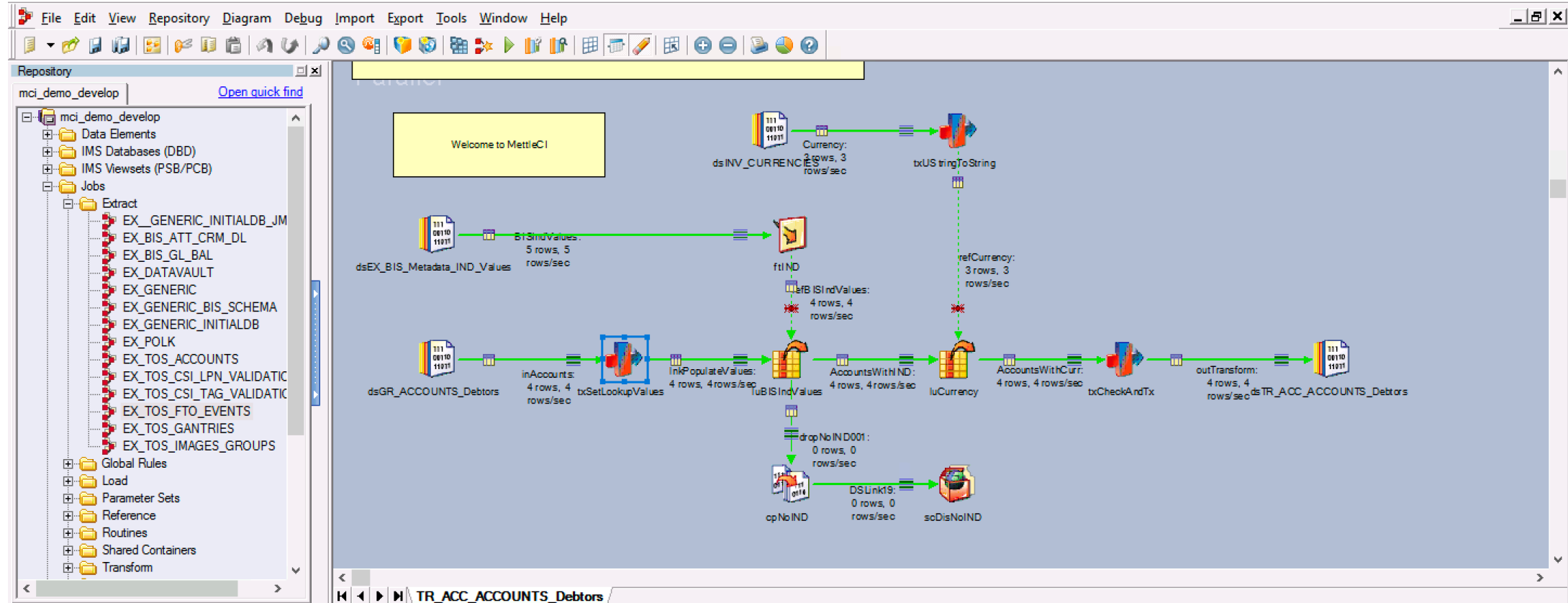
Type	Occurred	Event
	1/22/2019 2:54:15 ...	main_program: The open files limit is 1024; raising to 4096.
	1/22/2019 2:54:15 ...	main_program: conductor uname: -s=Linux; -r=3.10.0-514.26.2.el7.x86_64; -v=#1 SMP Fri Jun 30 05:26:04 UTC 2017; -n=demo1-engn.datamigrators.i...
	1/22/2019 2:54:15 ...	main_program: orchgeneral: loaded ...
	1/22/2019 2:54:17 ...	main_program: APT configuration file: /data/project/mci_demo_develop/config/default.apt ...
	1/22/2019 2:54:17 ...	scDisNoIND.sfDiscards,0: Export complete; 0 records exported successfully, 0 rejected.
	1/22/2019 2:54:17 ...	dsGR_ACCOUNTS_Debtors: Unit Test report(s) available: ...
	1/22/2019 2:54:17 ...	main_program: Step execution finished with status = OK.
	1/22/2019 2:54:17 ...	main_program: Startup time, 0:00; production run time, 0:00.
	1/22/2019 2:54:22 ...	Parallel job reports successful completion
	1/22/2019 2:54:28 ...	Finished Job TR_ACC_ACCOUNTS_Debtors.





Type	Occurred	Event
	1/22/2019 2:54:22 ...	Parallel job reports successful completion
	1/22/2019 2:54:28 ...	Finished Job TR_ACC_ACCOUNTS_Debtors.
	1/22/2019 5:02:12 ...	Starting Job TR_ACC_ACCOUNTS_Debtors. ...
<div> <b>1/22/2019 5:02:12 ... main_program: Data Migrators - Unit Testing Enabled</b> </div>		
	1/22/2019 5:02:12 ...	Parallel job default NLS map UTF-8, default locale OFF
	1/22/2019 5:02:12 ...	main_program: Data Migrators - Unit Testing Enabled
	1/22/2019 5:02:12 ...	main_program: Loading OSH
	1/22/2019 5:02:12 ...	main_program: Loading Job Parameters

Unit Test failures produce a job log warning



Displaying 134 Entries.

Type	Occurred	Event
	1/23/2019 7:36:14 ...	main_program: The open files limit is 1024; raising to 4096.
	1/23/2019 7:36:14 ...	main_program: conductor uname: -s=Linux; -r=3.10.0-514.26.2.el7.x86_64; -v=#1 SMP Fri Jun 30 05:26:04 UTC 2017; -n=demo1-engn.
	1/23/2019 7:36:14 ...	main_program: orchgeneral: loaded ...
	1/23/2019 7:36:16 ...	main_program: APT configuration file: /data/project/mci_demo_develop/config/default.apt ...
Warning	1/23/2019 7:36:16 ...	dsTR_ACC_ACCOUNTS_Debtors,0: Unit Test Failed
	1/23/2019 7:36:16 ...	scDisNoIND.sfDiscards,0: Export complete; 0 records exported successfully, 0 rejected.
	1/23/2019 7:36:16 ...	dsGR ACCOUNTS Debtors: Unit Test report(s) available: ...
Warning	1/23/2019 7:36:16 ...	dsTR_ACC_ACCOUNTS_Debtors,0: Unit Test Failed
	1/23/2019 7:36:21 ...	Parallel job reports successful completion

Unit Test failures produce a job log warning

File Edit View Repository Diagram Debug Import Export Tools Window Help

Data Set Management

- Advanced Find...
- Configurations...
- Message Handler Manager ...
- JCL Templates...
- Reporting Console...
- Run Director
- Multiple Job Compile
- Custom
- Options...

Repository

mci\_demo\_develop

Open quick find

- Data Elements
- IMS Databases (DBD)
- IMS Viewsets (PSB/PCB)
- Jobs
- Extract
  - EX\_GENERIC\_INITIAL\_DB...
  - EX\_BIS\_ATT...
  - EX\_BIS\_GL\_B...
  - EX\_DATAVAU...
  - EX\_GENERIC...
  - EX\_GENERIC...
  - EX\_GENERIC...
  - EX\_POLK...
  - EX\_TOS\_ACC...
  - EX\_TOS\_CSI...
  - EX\_TOS\_CSI...
  - EX\_TOS\_FTO...
  - EX\_TOS\_GAN...
  - EX\_TOS\_IMAGES\_GROUPS
- Global Rules
- Load
- Parameter Sets
- Reference
- Routines
- Shared Containers
- Transform

Unit test results

dsINV\_CURRENCY

txUS tringToString

ftlIND

sfB ISIndValues:

0 rows, 0 rows/sec

AccountsWithND:

0 rows, 0 rows/sec

luCurrency

AccountsWithCurr:

0 rows, 0 rows/sec

txCheckAndTx

outTransform:

0 rows, 0 rows/sec

dsTR\_ACC\_ACCOUNTS\_Debtors

dropNoIND001:

0 rows, 0 rows/sec

cpNoIND

DSLinkIS:

0 rows, 0 rows/sec

soDisNoIND

TR\_ACC\_ACCOUNTS\_Debtors

Displaying 88 Entries.

Type	Occurred	Event
	1/22/2019 2:54:15 ...	main_program: The open files limit is 1024; raising to 4096.
	1/22/2019 2:54:15 ...	main_program: conductor uname: -s=Linux; -r=3.10.0-514.26.2.el7.x86_64; -v=#1 SMP Fri Jun 30 05:26:04 UTC 2017; -n=demo1-engn.datamigrators.i...
	1/22/2019 2:54:15 ...	main_program: orchgeneral: loaded ...
	1/22/2019 2:54:17 ...	main_program: APT configuration file: /data/project/mci_demo_develop/config/default.apt ...
	1/22/2019 2:54:17 ...	scDisNoIND.sfdiscards,0: Export complete; 0 records exported successfully, 0 rejected.
	1/22/2019 2:54:17 ...	dsGR_ACCOUNTS_Debtors: Unit Test report(s) available: ...
	1/22/2019 2:54:17 ...	main_program: Step execution finished with status = OK.
	1/22/2019 2:54:17 ...	main_program: Startup time, 0:00; production run time, 0:00.
	1/22/2019 2:54:22 ...	Parallel job reports successful completion
	1/22/2019 2:54:28 ...	Finished Job TR_ACC_ACCOUNTS_Debtors.

TR\_ACC\_ACCOUNTS\_Debtors

SPECIFICATION

test1

Test 'test1' failed

Jan-23 06:36:15



1 output(s) failed to matched expected results while running 'test1' test.

**dsTR\_ACC\_ACCOUNTS\_Debtors.outTransform**

4 cell(s) changed from expected output

	TXT_PUBLIC_ID	TXT_INTEROP_ID	...	NUM_VOUCHER_TRIPS	DEC_BALANCE	DEC_LOW_BALANCE	...
->	098765432112	NULL	...	0	346000000->380600000	NULL	...
->	052475432239	NULL	...	0	443000000->487300000	NULL	...
->	388237364920	NULL	...	0	925000000->1017500000	NULL	...
->	746919274937	NULL	...	0	111000000->122100000	NULL	...

A visual diff  
of  
expected vs actual

TR\_ACC\_ACCOUNTS\_Debtors

Test 'test1' sucessful

Jan-22 04:02:13



SPECIFICATION

test1

All output matched expected results while running 'test1' test.

**dsTR\_ACC\_ACCOUNTS\_Debtors.outTransform**

No differences detected

# Static Code Analysis

## Lint-like anti-pattern identification

File Edit View Repository Diagram Debug Import Export Tools Window Help

Data Set Management

- Advanced Find...
- Configurations...
- Message Handler Manager ...
- JCL Templates...
- Reporting Console...
- Run Director
- Multiple Job Compile
- Custom**
- Options...

Repository

mci\_demo\_develop

Open quick find

- Data Elements
- IMS Databases (DBD)
- IMS Viewsets (PSB/PCB)
- Jobs
- Extract
  - EX\_GENERIC\_INITIAL\_DB\_IM
  - EX\_BIS\_ATT\_
  - EX\_BIS\_GL\_B
  - EX\_DATAVAU
  - EX\_GENERIC
  - EX\_GENERIC
  - EX\_GENERIC
  - EX\_POLK
  - EX\_TOS\_ACCO
  - EX\_TOS\_CSI
  - EX\_TOS\_CSI
  - EX\_TOS\_FTO
  - EX\_TOS\_GAN
  - EX\_TOS\_IMAGES\_GROUPS
- Global Rules
- Load
- Parameter Sets
- Reference
- Routines
- Shared Containers
- Transform

MettleCI - Unit Test Spec

MettleCI - Unit Test Result

**MettleCI - Check Compliance**

MettleCI - Check in Asset

Unit Test Spec

Unit Test Result

Check Compliance

Check In Asset

Customize...

Compliance

dsINV\_CURRENCIES

Currency: 0 rows, 0 rows/sec

txUS tringToString

refCurrency: 0 rows, 0 rows/sec

ftlIND

sfB ISIndValues: 0 rows, 0 rows/sec

AccountsWithND: 0 rows, 0 rows/sec

luCurrency

AccountsWithCurr: 0 rows, 0 rows/sec

txCheckAndTx

outTransform: 0 rows, 0 rows/sec

dsTR\_ACC\_ACCOUNTS\_Debtors

inAccounts: 0 rows, 0 rows/sec

txSetLookupValues

InkPopulateValues: 0 rows, 0 rows/sec

tuB ISIndValues

dropNoIND001: 0 rows, 0 rows/sec

cpNoIND

DSLinkIS: 0 rows, 0 rows/sec

soDisNoIND

TR\_ACC\_ACCOUNTS\_Debtors

Displaying 88 Entries.

Type	Occurred	Event
	1/22/2019 2:54:15 ...	main_program: The open files limit is 1024; raising to 4096.
	1/22/2019 2:54:15 ...	main_program: conductor uname: -s=Linux; -r=3.10.0-514.26.2.el7.x86_64; -v=#1 SMP Fri Jun 30 05:26:04 UTC 2017; -n=demo1-engn.datamigrators.i...
	1/22/2019 2:54:15 ...	main_program: orchgeneral: loaded ...
	1/22/2019 2:54:17 ...	main_program: APT configuration file: /data/project/mci_demo_develop/config/default.apt ...
	1/22/2019 2:54:17 ...	scDisNoIND.sfdiscards,0: Export complete; 0 records exported successfully, 0 rejected.
	1/22/2019 2:54:17 ...	dsGR_ACCOUNTS_Debtors: Unit Test report(s) available: ...
	1/22/2019 2:54:17 ...	main_program: Step execution finished with status = OK.
	1/22/2019 2:54:17 ...	main_program: Startup time, 0:00; production run time, 0:00.
	1/22/2019 2:54:22 ...	Parallel job reports successful completion
	1/22/2019 2:54:28 ...	Finished Job TR_ACC_ACCOUNTS_Debtors.

## Datastage Project

mci\_demo\_develop

## Datastage Asset

TR\_ACC\_ACCOUNTS\_Debtors

FAILURE

25  
Rules

23

Passed Rules



2

Failed Rules

Rule	Duration	Status	Message
Data Flow Designer Stages	0.005	SUCCESS	
SQL in DB Connectors	0.003	SUCCESS	
Unique Sort	0.003	SUCCESS	
File Reference	0.004	SUCCESS	
Too Many Stages	0.003	SUCCESS	
Stage Naming	0.005	FAILURE	Stage trxSetLookupValues of type CTransformerStage has an incorrectly formatted name It should follow the pattern: ^tx[A-Z0-9][A-Za-z0-9 _]*
System Time Dependency	0.004	SUCCESS	



## Datastage Project

mci\_demo\_develop

## Datastage Asset

TR\_ACC\_ACCOUNTS\_Debtors

FAILURE

25  
Rules

Filter results by status

2  
Failed Rules

Rule	Duration	Status	Message
Stage Naming	0.005	FAILURE	Stage trxSetLookupValues of type CTransformerStage has an incorrectly formatted name It should follow the pattern: ^tx[A-Z0-9][A-Za-z0-9_]*
Hardcoded File Paths	0.007	FAILURE	Stage dsGR_ACCOUNTS_Debtors of type PxDataSet has a hardcoded path Please include a valid parameter [pGlobal.DatasetDir]

## CLOSE LOGS

23-01-2019 22:04:34 Working Directory: /opt/mci2/workbench/working/thread-2/DatastageComplianceWorker  
23-01-2019 22:04:34 Cloning Compliance repository...  
23-01-2019 22:04:43 Connecting to DEMO1-ENGN.DATAMIGRATORS.IO/mci\_demo\_develop  
23-01-2019 22:05:06 Exporting DataStage assets...



Data Migrators / Compliance

## compliance-rules

Clone



Master list of Data Migrators' compliance rules.



master

Filter files



Compliance Rules are delivered as source code (in the form of a Git repository) for you to adapt as required.

Name	Size	Last commit	Message
Adjacent Transformers.pjb.grm	1.33 KB	2019-01-10	Removed redundant logging
Audit Drivers.pjb.grm	696 B	2017-10-06	Corrected Rational to Rationale
Audit Output.pjb.grm	665 B	2017-10-06	Corrected Rational to Rationale
Auditing Monitor.pjb.grm	1.42 KB	2017-10-06	Corrected Rational to Rationale
Auditing Variance.pjb.grm	1.45 KB	2017-10-06	Corrected Rational to Rationale
Data Flow Designer Stages.pjb.grm	11.74 KB	2018-11-08	Fix Spelling of Rational to Rationale and add more descriptiv...
Database Row Limit.pjb.grm	2.34 KB	2018-11-08	Fix Spelling of Rational to Rationale and add more descriptiv...
Debug Row Limit.pjb.grm	1.12 KB	2017-10-23	Fixed spelling and reviewed rationale
Deprecated Stages.pjb.grm	2.82 KB	2018-10-30	Stage Naming and Deprecated Stages updated. Also added f...
Deprecated Stages.sjb.grm	1.77 KB	2018-10-30	Stage Naming and Deprecated Stages updated. Also added f...
File Reference.pjb.grm	1.88 KB	2018-05-30	MCI-822 - Added check for writing to the same file, and refa...
File Row Limit.pjb.grm	1.75 KB	2017-10-23	Fixed spelling and reviewed rationale

### Repository details

Last updated  
5 days ago

Open pull requests  
1

Branches  
6

Watchers  
2

Forks  
0

Version control system  
Git

Access level  
Admin

### 1 of 3 builds failed

MettleCI - Test - Continuou...  
260 passed · 5 hours ago

MettleCI - Test - Continuou...  
8 passed · yesterday

Mettle DEMO Project - Con...  
11 passed · 2019-01-16

Give feedback

# Git Integration

Check in to any Git platform from DataStage Designer

File Edit View Repository Diagram Debug Import Export Tools Window Help

Data Set Management

- Advanced Find...
- Configurations...
- Message Handler Manager ...
- JCL Templates...
- Reporting Console...
- Run Director
- Multiple Job Compile
- Custom**
- Options...

Repository

mci\_demo\_develop

Open quick find

- Data Elements
- IMS Databases (DBD)
- IMS Viewsets (PSB/PCB)
- Jobs
- Extract
  - EX\_GENERIC\_INITIAL\_DB\_IM
  - EX\_BIS\_ATT\_
  - EX\_BIS\_GL\_B
  - EX\_DATAVAU
  - EX\_GENERIC
  - EX\_GENERIC
  - EX\_GENERIC
  - EX\_POLK
  - EX\_TOS\_ACCO
  - EX\_TOS\_CSI
  - EX\_TOS\_CSI
  - EX\_TOS\_FTO
  - EX\_TOS\_GAN
  - EX\_TOS\_IMAGES\_GROUPS
- Global Rules
- Load
- Parameter Sets
- Reference
- Routines
- Shared Containers
- Transform

Check in

dsINV\_CURRENCIES

txUS tringToString

refCurrency: 0 rows, 0 rows/sec

ftlIND

sfB ISIndValues: 0 rows, 0 rows/sec

AccountsWithND: 0 rows, 0 rows/sec

luCurrency

AccountsWithCurr: 0 rows, 0 rows/sec

txCheckAndTx

outTransform: 0 rows, 0 rows/sec

dsTR\_ACC\_ACCOUNTS\_Debtors

dropNoIND001: 0 rows, 0 rows/sec

cpNoIND

DSLinkIS: 0 rows, 0 rows/sec

soDisNoIND

TR\_ACC\_ACCOUNTS\_Debtors

Displaying 88 Entries.

Type	Occurred	Event
	1/22/2019 2:54:15 ...	main_program: The open files limit is 1024; raising to 4096.
	1/22/2019 2:54:15 ...	main_program: conductor uname: -s=Linux; -r=3.10.0-514.26.2.el7.x86_64; -v=#1 SMP Fri Jun 30 05:26:04 UTC 2017; -n=demo1-engn.datamigrators.i...
	1/22/2019 2:54:15 ...	main_program: orchgeneral: loaded ...
	1/22/2019 2:54:17 ...	main_program: APT configuration file: /data/project/mci_demo_develop/config/default.apt ...
	1/22/2019 2:54:17 ...	scDisNoIND.sfDiscards,0: Export complete; 0 records exported successfully, 0 rejected.
	1/22/2019 2:54:17 ...	dsGR_ACCOUNTS_Debtors: Unit Test report(s) available: ...
	1/22/2019 2:54:17 ...	main_program: Step execution finished with status = OK.
	1/22/2019 2:54:17 ...	main_program: Startup time, 0:00; production run time, 0:00.
	1/22/2019 2:54:22 ...	Parallel job reports successful completion
	1/22/2019 2:54:28 ...	Finished Job TR_ACC_ACCOUNTS_Debtors.

Datastage Project

mci\_testing\_develop

Asset(s)

TR\_ACC\_ACCOUNTS\_Debtors

Include Unit Tests



Commit Unit tests alongside jobs

Issue(s)

PROJ-10

PROJ-18

Minimum of one work item

Commit Message

Fixed the balance calculation error

Check in



Demo Project / Migration

# Source

develop ▾ ... Migration / datastage / Jobs / Transform / **TR\_ACC\_ACCOUNTS\_Debtors.isx**

**John McKeever** committed [7a9ddada03f](#) 1 min ago

Source view ▾ Diff to previous ▾ History ▾

Show source Edit Blame Raw file

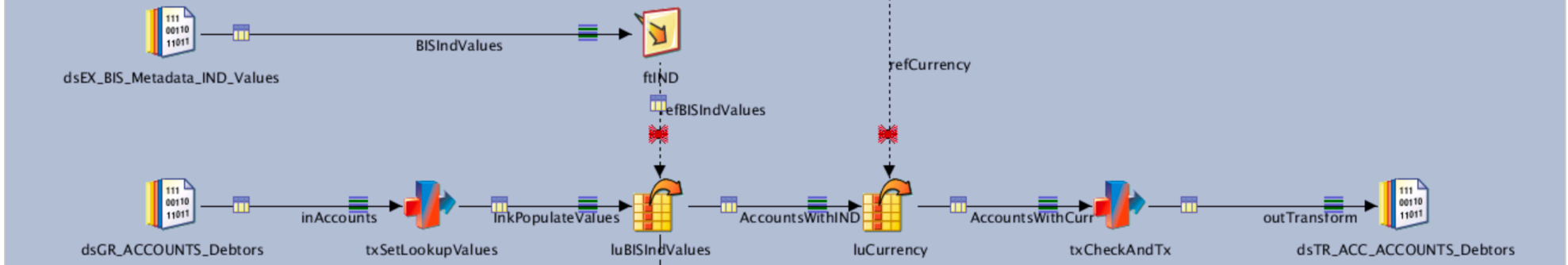
TR\_ACC\_ACCOUNTS\_Debtors

This job transforms all account  
<VARIANCE id="001" mapping  
IND\_INVOICE\_TYPE

Welcome to M

- John McKeever** committed [7a9ddada03f](#) 1 min ago  
Fixed two compliance issues
- John McKeever** committed [533bd8e72b0](#) Yesterday  
MDP-38 #comment Hello!
- John McKeever** committed [4b96fa769d7](#) 2 days ago  
#MDP-38 #comment My Monday afternoon check-in :-)
- John McKeever** committed [d903f107799](#) 2 days ago  
MDP-38 #comment Hello there!
- John McKeever** committed [7bd2d5746ec](#) 15 Jan 2019  
MDP-38 #comment Hello Israel
- John McKeever** committed [16e3645fa2d](#) 15 Jan 2019

DataStage canvas rendered  
in the Git repository browser



## Supported CI Build and Work Item Management Tools



**Jenkins**



GitLab

**GitHub**



Azure DevOps

**servicenow**<sup>TM</sup>



# Thank you



John McKeever  
Director

—

[john.mckeever@datamigrators.com](mailto:john.mckeever@datamigrators.com)  
+61-432-438-722

Justin McCamish  
Director

—

[justin.mccamish@datamigrators.com](mailto:justin.mccamish@datamigrators.com)  
+61-414-929-626