CRITICALRIVER

Energy & Water
Testing Automation

Reliability is not optional

Meter to Cash operations are the lifeblood of a distribution utility. This group:

- Is the interaction point providing customers with access to service

- Bills customers, fairly and consistently, for the cost of providing them that service

- Processes payments, and manage collections to make sure that everyone pays their fair share

Details vary by utility type and class of customer; but and a small set of applications have developed to enable a Utility to deliver service and meet the modern customer's meet expectations…
And they have to work, correctly, every hour of every day.

Software and reliability don't always go hand in hand

But business is not static.

And applications have to change.

Teams do their best to test that the changes they implement fix the problem – but too often, fixing something here breaks something there.

And too often, errors creep in can disrupt operations.

Domain Optimized Automated Testing to the Rescue

CriticalRiver's automated testing platform is built for meter to cash, to stop that disruption before it gets into production.

We apply:

- Targeted on-line testing of top transactions – with repeatable test cases & data – to ensure end users can still work

- Batch comparison to ensure that the high volume of highly varied data in nightly batch still produces expected results

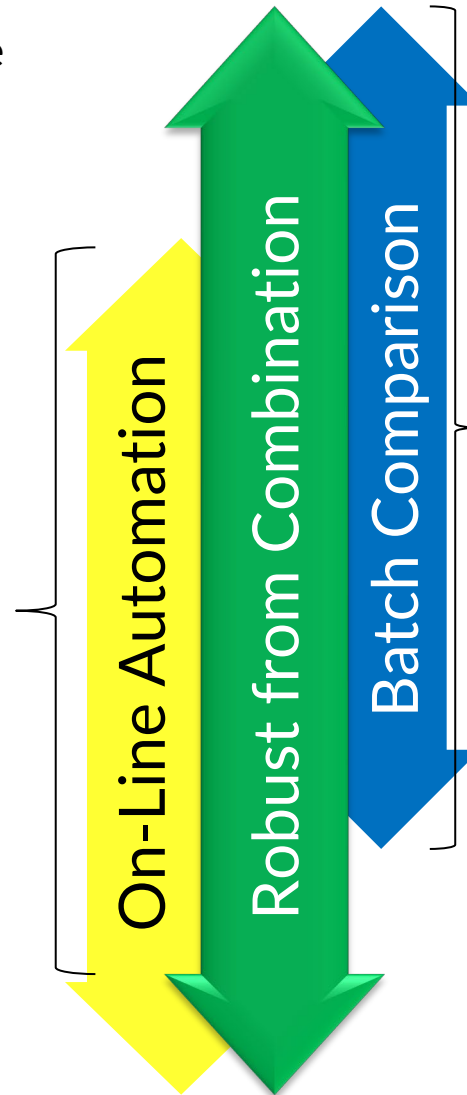Our clients can put enhancements and fixes into production and still sleep at night.

On-Line Test Components

- **Positive Testing:** a type of testing performed by a software application that provides valid input data sets. The respective entity should be created for the Positive Test data without error. Corresponding messages and screenshots will be captured and displayed in testing reports.

- **Negative Testing:** a testing method performed on the software application by providing invalid or improper data sets as input. Error messages should be generated for the Negative Test data. Corresponding error messages and screenshots will be captured and displayed in testing reports.

Reporting technique: Extent Reports, an open-source reporting library. Extent Reports use the logging style to add information about test sessions, such as creation of tests, adding screenshots, and adding events or series of steps to sequentially indicate the flow of test steps.

On-Line Automated Demo Outline: On-Line String Test

Component Test Cases:

- **Login into C2M Application**: This Test case is used to login to the C2M Application with valid credentials User ID and Password.

- **Create a Person**: This Test case is used to create a Person with data including Person Name, Contact Type, Contact Information, Identification number.

- **Create an Account**: This Test case is used to create a new Account for an existing Person.

- **Create a Premise**: This Test case is used to create a Premise with information including Premise Type, Address, County, City, State, Zip code, CIS Division.

- **Create Premise Characteristics**: This Test case is used to add Premise Characteristics like Taxing State, Taxing City with valid Characteristic values to an existing Premise.

- **Create a Service Point**: This Test case is used to create a Service Point with valid information like SP Type, Premise ID, Time Zone, Measurement Cycle.

Reports Snapshot from On-Line Test Demo

Login Test

`Feb 15, 2024 05:54:05 PM` `Feb 15, 2024 05:54:12 PM` `0h 0m 7s+398ms`

Login Test

Status	Timestamp	Details
ⓘ	5:54:06 PM	test passed
✓	5:54:12 PM	Login - Test Passed

Account Creation Test

`Feb 15, 2024 05:55:18 PM` `Feb 15, 2024 05:55:39 PM` `0h 0m 20s+734ms`

Account Creation Test

Status	Timestamp	Details
✓	5:55:39 PM	Account Creation Positive testing - Test Passed
ⓘ	5:55:39 PM	The new Account ID:9220337333

Person Creation Test

`Feb 15, 2024 05:54:22 PM` `Feb 15, 2024 05:55:14 PM` `0h 0m 52s+89ms`

Person Creation Test

Status	Timestamp	Details
✓	5:54:31 PM	Person Creation Negative testing - Test Passed
ⓘ	5:54:31 PM	Name field missing A mandatory field has been left blank. Please enter a value and retry your request. If you need support please supply the following info to system support: Message number: 3, 253
✓	5:54:42 PM	Person Creation Negative testing - Test Passed
✓	5:54:42 PM	Person Creation Negative testing - Test Passed
ⓘ	5:54:42 PM	Contact Information field missing A mandatory field has been left blank. Please enter a value and retry your request. If you need support please supply the following info to system support: Message number: 3, 253
✓	5:54:54 PM	Person Creation Negative testing - Test Passed
ⓘ	5:54:54 PM	ID Number field missing A mandatory field has been left blank. Please enter a value and retry your request. If you need support please supply the following info to system support: Message number: 3, 253
✓	5:55:13 PM	Person Creation Positive testing - Test Passed
ⓘ	5:55:14 PM	The new Person Person ID:2140808641

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Reports Snapshot from On-Line Test Demo

Premise Creation Test

| Feb 15, 2024 05:55:42 PM | Feb 15, 2024 05:56:12 PM | 0h 0m 29s+610ms |

Premise Creation Test

Status	Timestamp	Details
✅	5:55:56 PM	Premise Creation Negative testing - Test Passed
ⓘ	5:55:56 PM	Address field missing A mandatory field has been left blank. Please enter a value and retry your request. you need support please supply the following info to system support: Message number: 3, 253
✅	5:56:12 PM	Premise Creation Positive testing - Test Passed
ⓘ	5:56:12 PM	The new premise ID:1150914958

SP Creation Test

| Feb 15, 2024 05:56:51 PM | Feb 15, 2024 05:57:21 PM | 0h 0m 30s+277ms |

SP Creation Test

Status	Timestamp	Details
✅	5:57:03 PM	SP Creation Negative testing - Test Passed
ⓘ	5:57:03 PM	At least one criteria must be specified
✅	5:57:20 PM	SP Creation Positive testing - Test Passed
ⓘ	5:57:21 PM	The new SP ID:553296936087

PremiseChar Creation Test

| Feb 15, 2024 05:56:15 PM | Feb 15, 2024 05:56:46 PM | 0h 0m 31s+174ms |

premiseChar Creation Test

Status	Timestamp	Details
✅	5:56:25 PM	Premise Char Creation Negative testing - Test Passed
ⓘ	5:56:25 PM	Characteristic Value is required for Characteristic Type Taxing State (C2MTAXST). Characteristic Value is required for the specified Characteristic Type. If you need support please supply the following info to system support: Message number: 2, 55801
✅	5:56:32 PM	Premise Char Creation Positive testing - Test Passed
ⓘ	5:56:32 PM	Premise Char is created
✅	5:56:38 PM	Premise Char Creation Negative testing - Test Passed
ⓘ	5:56:38 PM	Characteristic Value is required for Characteristic Type Taxing City (C2MTCITY). Characteristic Value is required for the specified Characteristic Type. If you need support please supply the following info to system support: Message number: 2, 55801
✅	5:56:46 PM	Premise Char Creation Positive testing - Test Passed
ⓘ	5:56:46 PM	Premise Char is created

Snapshots from Reports

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Batch Comparison

Strategy: run daily batch with standard input conditions to includes all aspects of the system for all the varieties of data found in a given day:
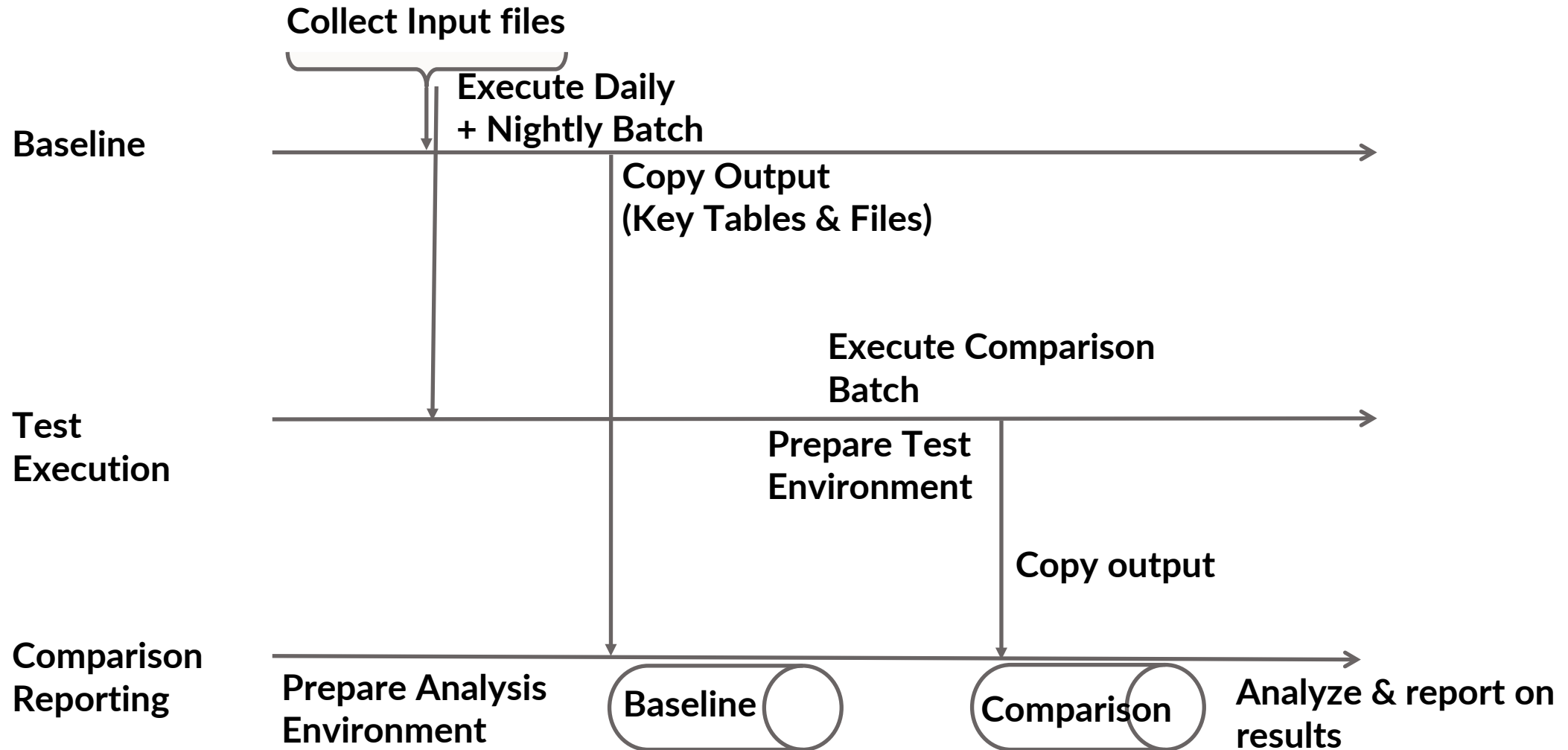
Data	Interfaces
Configuration	Extensions

Test analysts evaluate what any difference indicates:

- bug in new system or data? (catch these!),

- intended change? (correct charges from new rates? celebrate!)

- previously unknown bug in production? (plan how to address)

Knowing there's a difference enables intentional decisions

Batch Comparison Approach Overview

Collect Input files

Baseline

Execute Daily + Nightly Batch

Copy Output (Key Tables & Files)

Execute Comparison Batch

Test Execution

Prepare Test Environment

Copy output

Comparison Reporting

Prepare Analysis Environment

Baseline

Comparison

Analyze & report on results

Batch Comparison

Samples of issues caught by batch comparison: unintended impacts of changes to

- Configuration (especially rates)

- Interfaces (especially payments and meter reading)

- Unintended data changes

- Calculations (e.g. late payment charges_

Reports highlight differences

RPT0202 Current Charge Count by Bill Cycle

Bill Cycle	01
Current Charge Amount	
Perfect Match:	488
$0.01 Difference:	0
$0.02 -- $0.05 Difference:	0
$0.06 -- $0.10 Difference:	0
$0.11 -- $0.20 Difference:	0
$0.21 -- $0.30 Difference:	0
$0.31 -- $0.40 Difference:	0
$0.41 -- $0.50 Difference:	0
$0.51 -- $0.60 Difference:	0
$0.61 -- $0.70 Difference:	0
$0.71 -- $0.80 Difference:	0
$0.81 -- $0.90 Difference:	0
$0.91 -- $1.00 Difference:	0
$1.01 -- $2.00 Difference:	0
$2.01 -- $3.00 Difference:	0
$3.01 -- $4.00 Difference:	0
$4.01 -- $5.00 Difference:	0
$5.01 -- $10.00 Difference:	0
Greater $10 Difference:	0
Legacy Only:	1
New Only:	0
Total Accounts:	489

Account	New Line Ite	Old Line Ite	Service Typ	service_deta	charge_amt	match_type
10627976	7,5	7,48	Meter	Loc 42482 / Se	0,02	Both
10379700		3,93	Meter	Loc 97637 / Se		Old Only
10379700		21,98	Meter	Loc 97637 / Se		Old Only
10379700		-0,84	Meter	Loc 97637 / Se		Old Only
10379700		10,98	Meter	Loc 97637 / Se		Old Only
10379700		7,48	Meter	Loc 97637 / Se		Old Only
10379700		0,43	Meter	Loc 97637 / Se		Old Only

(partially obscured:) 0,00% ... Total $0.00 - $0.01: 99,80%

0,00% Total $0.00 - $1.00: 99,80%

Differences to investigate - may be
- Desired: e.g. new rates
- Bugs caught in new version
- Bugs or unknown features in old version

Comparison reports quickly identify exceptions to remediate or celebrate