



Disaster Recovery Plan Exercise Results

2021

December 21, 2021

Managed Cloud Services

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Acronyms

Acronym	Term
AWS	Amazon Web Services
DR	Disaster Recovery
DRP	Disaster Recovery Plan
RDS	Relational Database Service
RPO	Recovery Point Objective
RTO	Recovery Time Objective
SOC	System and Organization Controls

Overview

To verify that the DRP can be executed successfully in an actual DR situation, Ellucian performs an annual DR test of the DRP processes. The DR test determines the viability of the DR tool in a test environment where the client's production environment becomes unavailable and unrecoverable within the original AWS region and must be failed over and recovered quickly in the designated DR region with minimal impact to the Client.

Objectives

- Confirm and verify the integrity of the data.
- Evaluate the current DRP from start to finish.
- Identify opportunities that improve our planning and recovery from a disaster testing (lessons learned).
- Test the failover process and communication plan.
- Test the technical DRP process and confirm full system replication across AWS regions.
- Verify that synthetic transactions inserted in the environment prior to failover exist in the replicated environment upon restoration.

Criteria for Success

- DR test team are assembled and engaged to handle and resolve the incident.
- Pre-exercise cross region replication from source to target yields expected results.
- Recovery should be successful, and data verified in the DR region.
- Recovery is within the RPO and RTO targets.
- Validate the existence of DR test transactions in the restored DR region.

An internal report of the DR Test is prepared to summarize the test, the timeline of events and report on each step of the DRP, including the success or failure of any of the DRP stages.

Exercise Scope

Colleague Managed Cloud environment.

Testing and reconfiguring 3rd party applications installed or stored outside of Ellucian's Cloud environment with their respective vendor contacts were excluded from this exercise.

Client Responsibilities

For testing purposes, Clients will need to determine which 3rd party applications or non-core applications can be temporarily disabled until full production functionality is restored in the primary site.

RTO and RPO

RTO is the time goal to recover our customer systems after a disaster is declared. It is measured from the time that Managed Cloud Services are interrupted due to a disaster until those services are returned to a steady state of operation in accordance with applicable Service Level Agreements.

RPO is the time increment for recovering steady-state data files. It is measured from the time the first transaction is lost or from the time Managed Cloud Services are interrupted due to a disaster, to the time when the applications and data were last recorded in sync.

Typically, Ellucian RTO is 24 hours and RPO is two hours, though we always seek to minimize whenever possible. These can vary by product, and the Client contract should be referred to for the RTO and RPO terms.

Exercise Planning

Test Artificialities

DR testing is not an actual event but rather a simulation that strives to resemble an actual event to validate capabilities and plans within the scope and objective parameters. To protect the production environment and data, certain test conditions may not completely reflect actions taken during a real event. These are termed “test artificialities”. We do not expect that these differences will have an adverse effect on executing a real event. Known test artificialities during testing are:

1. Actual Client data in form and content is not used in the Colleague database. Representative data used for load testing and other research and development purposes is used, which will not match Client data and context exactly.
2. Database size is smaller than the typical database size. Test databases are in the 100 GB range, while Client databases may range from 200 GB to 2 TB. The recovery time for a larger database may be longer.
3. Email relay testing, verification connection to email server was completed, however sending of email is not tested due to anti-spam rules.
4. While other processes and workflows are used prior to DR activation (like the 911 Multi-Client P1 Incident Management Process), testing those processes is excluded from this testing since they are exercised regularly as part of on-going daily support operations.
5. The actual 911 bridge line and Zoom meeting are not used during testing. An alternative bridge and Zoom meeting are utilized during testing.
6. A staging environment of ServiceNow is used for incident creation and status updates. During an actual outage and DR activation, the production ServiceNow environment would be used.
7. During an actual DR activation multiple steps in the process would be executed in parallel. For DR exercise purposes, the steps are generally done in serial to aid in recording of start and stop timing.

Team Roles and Responsibilities

The roles and responsibilities of team members who will be necessary during a DR event are outlined in a separate DRP document. These roles and responsibilities are utilized for the DR exercise with team members identifying themselves and providing their specific responsibilities during the activation.

Exercise Planning and Activation Team

Role	Responsibilities	Ellucian Job Title
Management Sponsor	Oversight of DR Planning and Execution	Senior Director, Cloud Engineering
Business Resiliency Management Office	Internal Auditor (Observe and Feedback)	Manager, Business Resiliency Office
Information Security	Internal Auditor (Observe and Feedback)	Senior Information Security Analyst
ITIL/ITSM	Internal Auditor (Observe and Feedback)	Operations Manager
DR Incident Manager	Planning and Execution of DR	Senior Manager, Cloud Engineering
Network Engineers	DR Execution Cloud Network	Senior Cloud Engineers (Network)
Platform Engineers	DR Execution Cloud Platform	Senior Cloud Engineers (Platform)
Supporting Infrastructure Engineer	DR Execution for Monitoring and Alerting	Cloud Engineer (EOC)
Ethos Administration	DR Execution, EIS validation	Cloud Applications Administrators
Colleague Administration	DR Execution, Application Validation, Database Validation	Cloud Application Administrators
Client Assurance	DR Execution and Client communications	Cloud Assurance Manager
3rd party Vendor Support	Technical Remediation, Product/Process improvements compared to industry	Senior Solutions Architect

DR Activation Exercise Details

Exercise Details	
Name of Exercise	2021 Disaster Recovery Plan Exercise Results
Type of Exercise	Failover Simulation
Test 1 Exercise Start/End Date	December 8, 2021
Test 2 Exercise Start/End Date	December 10, 2021
Test 3 Exercise Start/End Date	December 14, 2021
Colleague DR Activation Duration	47 minutes
Location	Remote Users via Command Center Bridge Line (zoom)
Scenario Type	Cross-Region Recovery of Colleague Application Service Environments

Exercise Results Summary

Test 1: There were some issues identified with instance types used for the test environment. Additional updates to the application deployment were also needed post migration to match actual customer deployments. Issues joining the DR region instances to the domain were also identified due to delays in initiating all required network failover steps. All source data was stored and transferred but the synthetic transaction created for testing purposes did not transfer.

Complete failover was not successful. One of the purposes for DR testing is to identify issues prior to actual DR. During Test 1 we were able to identify items needing attention.

Test 2: Fixes were implemented to the AWS environment in the DR region to ensure correct instance types were used. Additional items related to the application used for restoration were modified to account for challenges discovered in Test 1. Timeline of events were clearly executed for this test and all data was transferred correctly within expected objective times.

Test 3: The final test mirrored execution during Test 2 with a successful replication of pre-existing data as well as injected synthetic transaction.

1. Creation of near production DR Test Colleague environment - Successful (Pre-Exercise Work).
 - a. Colleague DR environment built using our standard build process that are used in building Client production environments.
 - b. Support Services replicas of the environments were built that included both Alerting and Monitoring.
 - c. Production versions of the Colleague Application were used to verify usability and continuity of DR TEST data.
 - d. Use of SSL Certs, DNS entries, and Network connections were set up and verified in production configurations.
2. Exercise Commencement – Successful
 - a. Shutdown the DB and application systems initiated to replicate the loss of the production server. All Teams engaged on-site in situation room and/or engaged via video conferencing (Zoom).
3. Failover Initiation – Successful

- a. All Instances deployed and launched in US West Region.
- 4. Core Platform and Network Failover completion – Successful
 - a. All servers up on the US West Region, accessible and in healthy state.
- 5. Support Service Infrastructure Failover completion - Successful
 - a. All Monitoring and alerting services are reporting green status, as expected.
- 6. Colleague application start of services - Successful
 - a. All services were started in correct order.
 - b. All authentication for user access working as expected (same as pre and post DR).
 - c. All verification of data is present, no data loss or corruption.
 - d. All verification of application functions working after DR.

Colleague DR Exercise Chronology

Date	Start/Stop	Action
12/14/2021	15:33/16:23	Colleague DR Exercise 2018 SOC Audit Initiated
12/14/2021	15:33/15:37	Step 0: Pre-Validation of environment & synthetic record creation
12/14/2021	15:38/15:39	Step 1: Colleague instances stopped
12/14/2021	15:39/15:39	Step 2: Datadog monitoring reports Colleague systems down
12/14/2021	15:40/15:40	Step 3: Discussion of Incident and Declaration of DR
12/14/2021	15:40/15:40	Step 4: (Platform) Confirm DR Region State
12/14/2021	15:41/15:42	Step 5: (Platform) locate Client Project in DR tooling & initiate failover
12/14/2021	15:45/15:56	Step 6: (Platform) Confirm VPC and instance creation in DR region
12/14/2021	15:45/16:01	Step 7: (Network) Enable DR VPC Transit & Internet connectivity
12/14/2021	15:50/15:55	Step 8: (Network) Create any needed DR LB for Migrated systems
12/14/2021	15:55/15:55	Step 9: (Network) Update Route 53 DNS entries as needed
12/14/2021	15:56/16:05	Step 10a: (Platform) Validate DR AD join Windows
12/14/2021	15:56/16:05	Step 10b: (Platform) Validate DR AD join for Linux
12/14/2021	16:05/16:06	Step 11: (Platform, Network) Post DR Client validation
12/14/2021	16:06/16:08	Step 12: (App) Colleague Application initiation of services
12/14/2021	16:08/16:12	Step 13: Validate Colleague reporting valid record counts
12/14/2021	16:12/16:23	Step 14: Validate Database file integrity

Exercise Results Summary

The DR team responded immediately, and it was promptly engaged and operational. The ability to do a full system replication and restoration from AWS US East region to US West region was successfully demonstrated. Transactions were verified that they were successfully replicated. The restoration was done well within the RTO and RPO targets.

The DR technology utilized implements entire application stack replication from source to target region - including all instances, attached storage, database, network topology, firewalls, load balancers, etc. Block level real-time continuous replication allows restoration of data in its most up-to-date state (i.e., last transactions committed before DR launch).

Colleague DR Exercise Results

System/Component	Technical Recovery (Successful/Not Successful)	Operational Recovery (Successful/Not Successful)	Recovery Duration (Individual groups work in parallel to each other and times will add up to more than total time)
Complete End to End Colleague Environment	Successful	Successful	50 minutes
Platform Infrastructure	Successful	Successful	0 hour 25 minutes
Network Infrastructure	Successful	Successful	0 hour 15 minutes
Colleague Application Validation	Successful	Successful	0 hour 31 minutes

DR RTO and RPO Results

Measure	Description of Measure	Ellucian Target	Exercise Results (Actuals)
RTO Colleague	RTO is measured from the time Managed Cloud Services are declared to have become unavailable until such services become available and operational.	24 hours	50 minutes
RPO Colleague	RPO is the time increment between when all application data is last in sync before the time Managed Cloud Services are declared to have become unavailable.	2 hours	3 minutes

Items Identified for Future Improvements

1. Core Infrastructure
 - a. Continue enhancing automation of various activation steps including auto detection after failover for quicker validation.
2. Application Validation
 - a. Develop scripts to validate application including reporting of data once systems are back online.

Compliance

Cloud Network team must have documented procedures for Disaster Recovery Plan Exercise Results and must be able to produce the document when required for auditing purposes.

Evidence of the Disaster Recovery Plan Exercise Results must be available when required for auditing purposes.

Related Policies and Procedures

- [Business Resilience Standard](#)
- [DR Documents Repository](#)

Document Review

At a minimum, this Disaster Recovery Plan Exercise Results must be reviewed every 12 months.

The Cloud Network team is responsible for facilitating and tracking the review of this Disaster Recovery Plan Exercise Results.

The Cloud Network team and the Information Security Risk and Compliance team are responsible for reviewing and commenting on this test plan.

The VP, Common Architecture and Director, Cloud Engineering is responsible for approving this test plan.

Approval

APPROVALS:

Kyung Ro
Kyung Ro, VP, Common Architecture

Blake Keller
Blake Keller, Dir, Cloud Operations

Effective Dates

This Disaster Recovery Plan Exercise Results was approved on December 21, 2021 and shall be effective on December 21, 2021.

DOCUMENT APPROVAL/CHANGE APPROVAL:

Approval of this document signifies concurrence with all sections herein defined. Once the document has been approved, changes to any aspect of the procedural documentation, including governances, mandates, process flow narratives, functionality and/or data elements, must undergo a new review and approval process.

Revision History

Revision No.	Author/Reviewer	Change/Purpose	Date of Creation/Change/Review
1.0	Randy Wheaton	Annual 2016 DR Test Exercise Report	12/2016
2.0	Anup Batra	Annual 2017 DR Test Exercise Report	12/2017
3.0	Denver Martin	Annual 2018 DR Test Exercise Report	12/11/2018
3.1	John Ogando	Review, and Edits	01/03/2019
3.2	Anup Batra	Review, and Final Edits	01/03/2019
3.3	Chuck McKinster	Approval via email	01/28/2019
3.4	Kyung Ro	Approval via email	01/28/2019
3.5	Rosemary Kuperberg	Final Edits and Approval	01/30/2019
4.0	Denver Martin	Annual 2019 DR Test Exercise Report	12/20/2019
4.1	Jessica Riofrio	Final notes and edits with reviewing committee	02/05/2020
4.2	Amber Wright	Copy edit review consisting of legacy term replacement, acronym use and comments regarding customer facing nature.	02/27/2020
4.3	Jessica Riofrio	Reviewed edits and approved the track changes made to the document by Amber Wright.	02/27/2020
5.0	Josue Colon	Annual 2021 DR Test Exercise Report	12/15/2021
5.1	Jessica Riofrio	Edited documentation with new branding, reformatted and cleaned-up tables.	12/16/2021
5.2	Josue Colon and Blake Keller	Review final document before signature approvals.	12/21/2021
5.3	Blake Keller	Approved via signature.	12/21/2021
5.4	Kyung Ro	Approved via signature.	12/21/2021

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