

7.6 Rebuild and Deploy

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Within the destination [Disconnected Environment](#) or [Air-Gapped Environment](#), [Crucible](#) uses the imported content and populated [Offline Repositories](#) to construct required Images and deploy the intended environment.

The destination-side lifecycle uses locally available inputs rather than depending on direct access to connected repositories, registries, provider services, or other unavailable external resources.

Prepare the Destination-Side Inputs

Crucible identifies the controlled inputs required for the destination-side construction and deployment activities.

The inputs can include:

- Imported application content
- Selected Baselines
- Image Layers
- Infrastructure Baselines
- Base Images
- Software packages
- Build tools
- Runtime libraries
- Configuration definitions
- Compliance content
- Provider tools and plugins
- Direct and transitive Dependencies
- Deployment parameters
- Provider-specific parameters

The applicable lifecycle definition determines which inputs the activity requires.

Crucible obtains those inputs from the imported Transfer Bundle, populated Offline Repositories, approved destination repositories, or other authorized resources available within the destination environment.

Resolve Dependencies Locally

Destination-side tools resolve required Dependencies from the populated Offline Repositories.

Local dependency resolution avoids reliance on an unavailable connected source.

The resolution activity can confirm:

- The required Dependency is available
- The selected version or revision is available
- Direct and transitive Dependencies are resolvable
- Required repository metadata is available
- Recorded integrity information matches the local content
- The Dependency is available to the applicable construction or deployment tool

Crucible does not silently substitute another Dependency version when the selected version is unavailable.

A missing or unresolved Dependency can prevent the applicable construction or deployment activity from completing.

Rebuild Images

When the destination activity requires a Machine Image or Container Image, Crucible constructs the Image from the locally available controlled inputs.

The reconstruction activity can include:

1. Select the applicable Image definition
2. Resolve required Dependencies from Offline Repositories
3. Apply the selected Image Layers
4. Apply application and configuration content
5. Execute the applicable build process
6. Produce the resulting Image
7. Assign the Image identifier and revision
8. Record the Image content digest
9. Sign or verify the Image when required by the applicable workflow
10. Record the construction result

The reconstructed Image remains associated with the Baselines, Dependencies, parameters, and other controlled inputs used to produce it.

A destination-side reconstruction does not require the resulting Image to have the same provider-specific representation as an Image constructed in another environment. The applicable requirements and Acceptance Criteria determine whether the reconstructed result is acceptable.

Prepare the Deployment

Crucible prepares the locally available inputs required to realize the destination environment.

The deployment inputs can include:

- The applicable Infrastructure Baseline
- Reconstructed or imported Machine Images
- Reconstructed or imported Container Images
- Application artifacts

- Configuration definitions
- Network definitions
- Storage definitions
- Security configuration
- Locally available Dependencies
- Credential references
- Deployment parameters
- Provider-specific parameters

Each input retains its identity and revision so Crucible can relate the deployed result to the content used to create it.

Select the Destination Deployment Target

Crucible identifies an authorized Deployment Target within the destination environment.

The selected target must provide the resources and interfaces required by the applicable deployment definition.

A destination Deployment Target can include:

- Virtualized infrastructure
- Physical infrastructure
- Container infrastructure
- Private cloud infrastructure
- Local platform services
- Another supported infrastructure environment available within the destination Security Domain

The applicable Provider Implementation resolves provider-independent deployment intent into the operations and parameters required by the selected destination platform.

Deploy the Environment

Crucible performs the operations required to realize the intended environment on the selected destination Deployment Target.

The deployment can include:

1. Verify the required deployment inputs
2. Verify locally available Dependencies
3. Prepare the Deployment Target
4. Create or configure infrastructure resources
5. Create network and storage resources
6. Instantiate Machine Images or Container Images
7. Apply configuration
8. Deploy application workloads
9. Apply security configuration
10. Execute required post-deployment activities

11. Record the result of each operation

The applicable Infrastructure Baseline and deployment definition determine which operations apply and their required order.

Operate Without Connected Resources

The reconstruction and deployment activities use resources available within the destination operational boundary.

The activities do not depend on direct access to:

- External source repositories
- External package repositories
- External Image registries
- Connected build services
- Connected assessment services
- Unavailable provider services
- Other resources outside the destination boundary

If a required resource is not available locally, Crucible records the unresolved condition rather than substituting an unidentified resource or bypassing the applicable boundary controls.

Handle Construction and Deployment Failures

Crucible records a failure that prevents successful reconstruction or deployment.

A failure record can identify:

- The failed activity
- The affected Image or Deployment Target
- The controlled inputs supplied
- The missing or unresolved Dependency
- The observed failure
- The operations completed before the failure
- The resources created or changed
- The resulting state

The applicable workflow determines whether the failure requires correction, production of another Transfer Bundle, additional repository population, reconstruction, redeployment, rollback, or another authorized activity.

Rebuild and Deployment Result

The result identifies:

- The destination environment
- The controlled inputs used
- The Offline Repositories used
- The Dependencies resolved
- Each constructed Image
- Each Image identifier and revision
- The selected Deployment Target
- The Infrastructure Baseline and revision
- The Provider Implementation
- The deployment parameters
- The deployment operations performed
- The status of each operation
- The resources created or changed
- The resulting deployment status
- Any missing Dependency, failure, or unresolved condition

The resulting deployment can undergo the applicable deployment validation and compliance assessment activities within the destination environment.

Requirements Addressed

Requirement	Statement
FR-IMG-001 — Build Virtual Machine Images	Crucible SHALL build Machine Images .
FR-IMG-002 — Build Container Images	Crucible SHALL build Container Images .
FR-DEP-001 — Deploy Infrastructure Resources	Crucible SHALL deploy Infrastructure Resources .
FR-DEP-002 — Deploy Virtual Machines	Crucible SHALL deploy Virtual Machines .
FR-DEP-003 — Deploy Kubernetes Clusters	Crucible SHALL deploy Kubernetes Clusters .
FR-DEP-004 — Deploy Containerized Workloads	Crucible SHALL deploy Containerized Workloads .
FR-DEP-005 — Deploy Platform Services	Crucible SHALL deploy Platform Services .
FR-DEPC-004 — Populate Offline Repositories	Crucible SHALL populate Offline Repositories in a Disconnected Environment from a Transfer Bundle .

The linked leaf requirement pages remain the canonical sources.

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