

5.2 Construct Images

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[Crucible](#) constructs identified and version-controlled [Images](#) from controlled inputs.

Supported image forms include:

- [Machine Images](#) used to create virtual machines
- [Container Images](#) used to create containerized workloads

Image construction uses the applicable [Baseline Composition](#), selected [Image Layers](#), configuration, software packages, dependencies, security content, and other [Controlled Inputs](#) required by the selected image build.

Image Build Inputs

The image build identifies the inputs required to construct the intended Image.

These inputs can include:

- A base Image
- Selected Image Layers
- Operating-system content
- Software packages
- Application content
- Configuration definitions
- Security configuration
- Compliance content
- Build tools
- Build dependencies
- Image metadata
- Applicable build parameters
- The applicable Crucible Description

Each controlled input retains its identity and revision so the resulting Image can be related to the content used to construct it.

Machine Images

Crucible constructs Machine Images used to create virtual machines.

A Machine Image build applies the selected Image Layers and other Controlled Inputs to the applicable base Image or image-building environment.

The resulting Machine Image has an identifiable representation that can be stored, retrieved, assessed, signed, verified, promoted, transferred, and deployed according to the applicable lifecycle

requirements.

Machine Image construction does not itself authorize deployment. Separate requirements govern Image verification, promotion, deployment, and operational approval.

Container Images

Crucible constructs Container Images used to create containerized workloads.

A Container Image build applies the selected Image Layers, application content, configuration, packages, and other Controlled Inputs required by the applicable build.

The resulting Container Image has an identifiable representation that can be stored, retrieved, assessed, signed, verified, promoted, transferred, and deployed according to the applicable lifecycle requirements.

Container Image construction does not require the same image format, build mechanism, or runtime used for Machine Images.

Immutable Image Workflows

When a required change affects a deployed Image, Crucible constructs a new Image rather than modifying the existing deployed Image in place.

The newly constructed Image incorporates the required changes and receives its own identifiable revision.

An immutable image workflow preserves the relationship among:

- The existing deployed Image
- The required change
- The Controlled Inputs used to construct the replacement Image
- The newly constructed Image
- The replacement operation
- The resulting deployed state

The workflow does not prohibit changes to persistent data, credentials, network resources, or other state maintained separately from the Image.

Image Signing

Crucible signs an identified Image according to the applicable signing conditions.

The signing activity associates a [Digital Signature](#) with the identified Image.

The resulting record identifies:

- The signed Image
- The Image identifier and revision
- The Image content digest
- The signing identity
- The applicable signing conditions
- The Digital Signature
- The signing result

Image signing provides integrity and authenticity information but does not independently establish compliance, approval, promotion, or authorization for deployment.

Image Verification

Crucible verifies the Digital Signature associated with an identified Image.

Image verification determines whether the evaluated signature remains valid for the identified Image under the applicable verification conditions.

The verification activity records:

- The evaluated Image
- The Image identifier and revision
- The evaluated Digital Signature
- The applicable verification conditions
- The verification result
- The resulting [Evidence](#)

A valid Digital Signature does not independently establish that the Image:

- Is free from vulnerabilities
- Satisfies a Compliance Baseline
- Is approved for promotion
- Is authorized for deployment
- Is compatible with a Deployment Target
- Is suitable for a specified purpose

Separate requirements govern those determinations.

Image Promotion

Crucible can promote an identified Image from one defined promotion state to another after the Image satisfies the applicable transition criteria.

The applicable promotion workflow defines:

- The promotion states
- The permitted state transitions
- The transition criteria
- The Evidence required for each transition

- The resulting promotion record

Promotion states can represent lifecycle conditions such as construction, evaluation, signing, verification, approval, release, availability for deployment, or retirement. The applicable workflow determines which states and transitions apply.

Image promotion does not independently define the assessments, approvals, or other conditions used as transition criteria. The applicable requirements, policies, and promotion workflow define those conditions.

Image Construction Result

The image-construction result records:

- The Image identifier
- The Image revision
- The Image form
- The selected Baseline Composition
- The selected Image Layers
- The Controlled Inputs
- The build operation
- The build result
- The Image content digest
- The associated Digital Signature, when produced
- The signature-verification result, when performed
- The promotion state, when applicable
- The associated [Provenance](#)
- The associated [Traceability](#)
- The generated Evidence

The constructed Image becomes a controlled input to subsequent assessment, transfer, deployment, validation, replacement, or retirement activities.

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-IMG-003 — Immutable Infrastructure Workflows	Crucible SHALL apply changes to deployed images by replacing the images rather than modifying them in place.
FR-IMG-004 — Image Signing	Crucible SHALL generate a Digital Signature for an identified Image and associate the Digital Signature with that Image.
FR-IMG-005 — Image Verification	Crucible SHALL verify the Digital Signature associated with an identified Image .

Requirement	Statement
FR-IMG-006 — Image Promotion Workflows	Crucible SHALL perform Image Promotion for an identified Image after the Image satisfies the applicable transition criteria.

The linked leaf requirement pages remain the canonical sources.

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