Working with Images

Nigel Poulton

@nigelpoulton www.nigelpoulton.com

Working with Images

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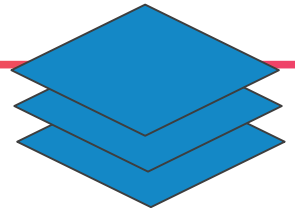

Building New Images

(Containerizing an App)

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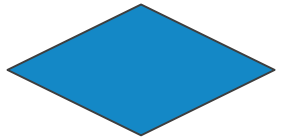
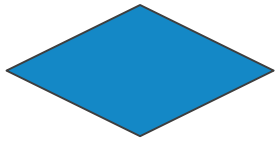
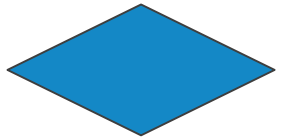


Working with Images

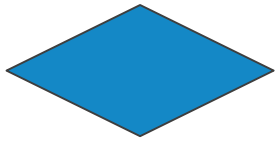


Building New Images
(Containerizing an App)



Working with Images

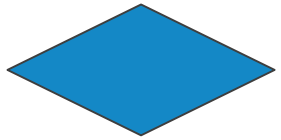
- Big Picture
- Details
- Registries
- Best practices
- Recap



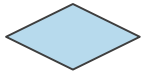
Building New Images

(Containerizing an App)

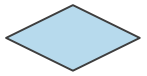
NEXT MODULE



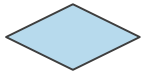
Working with Images



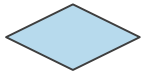
- Big Picture



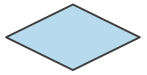
- Details



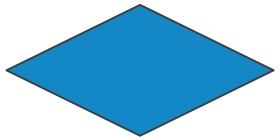
- Registries



- Best practices



- Recap



Building New Images

NEXT MODULE

(Containerizing an App)

Domain 2: Image Creation, Management, and Registry

- Use CLI commands such as list, delete, prune, rmi, etc to manage images
- Inspect images and report specific attributes using filter and format
- Push an image to a registry
- Pull an image from a registry
- Describe how image layers work
- Display layers of a Docker image
- Describe how image deletion works
- Demonstrate tagging an image
- Tag an image
- Utilize a registry to store an image

Coming up

Images Big Picture

Images Big Picture

Templates - Read-only - Sharable

Images Big Picture

Templates - Read-only - Sharable

SUGGESTED COURSE

Getting Started with Docker

Beginner

Images Big Picture

Templates - Read-only - Sharable

SUGGESTED COURSE

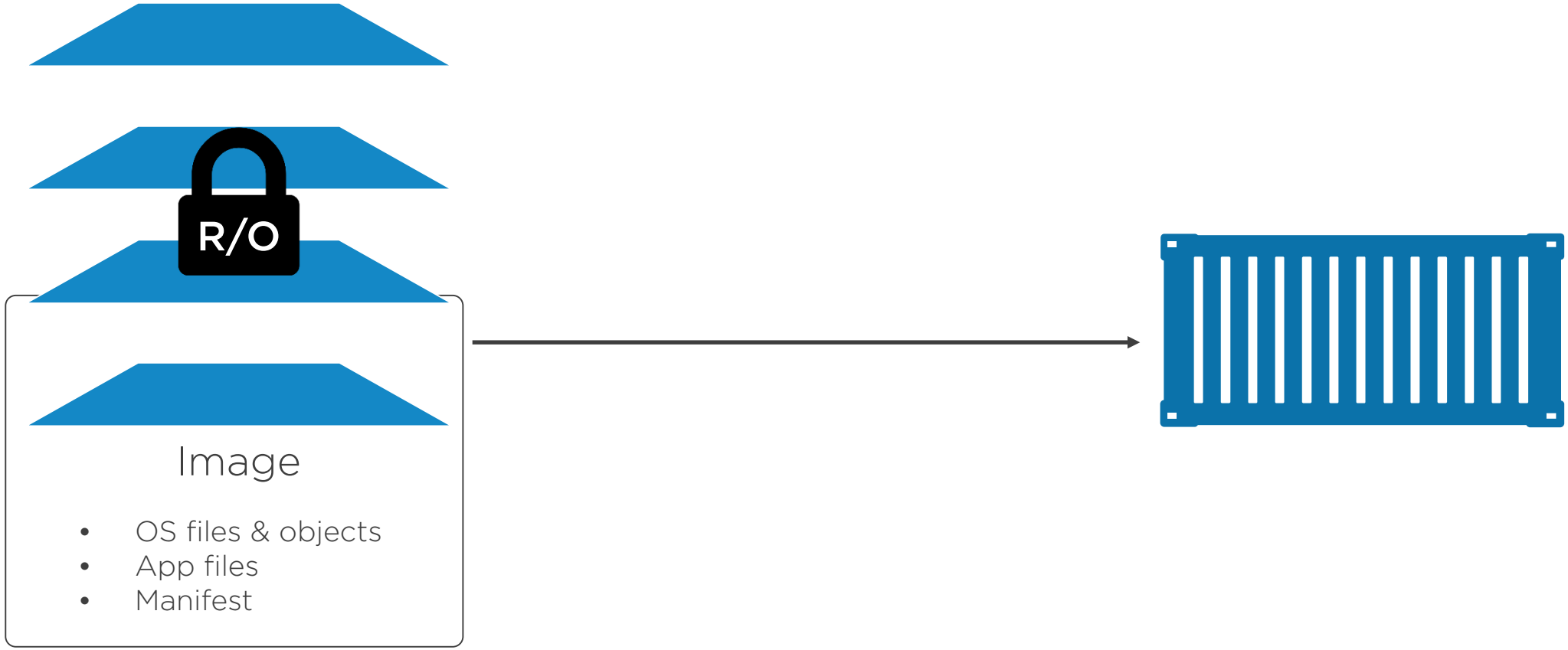
Getting Started with Docker

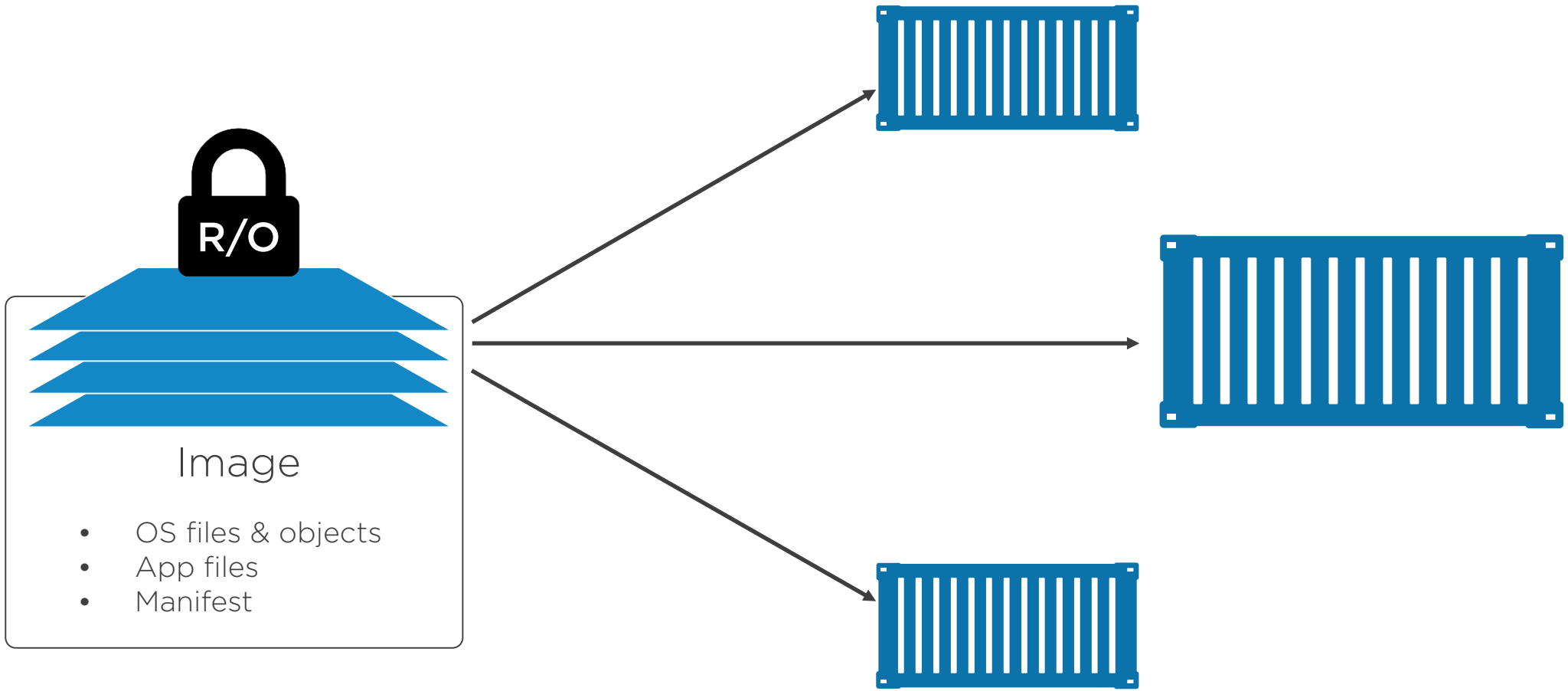
Beginner

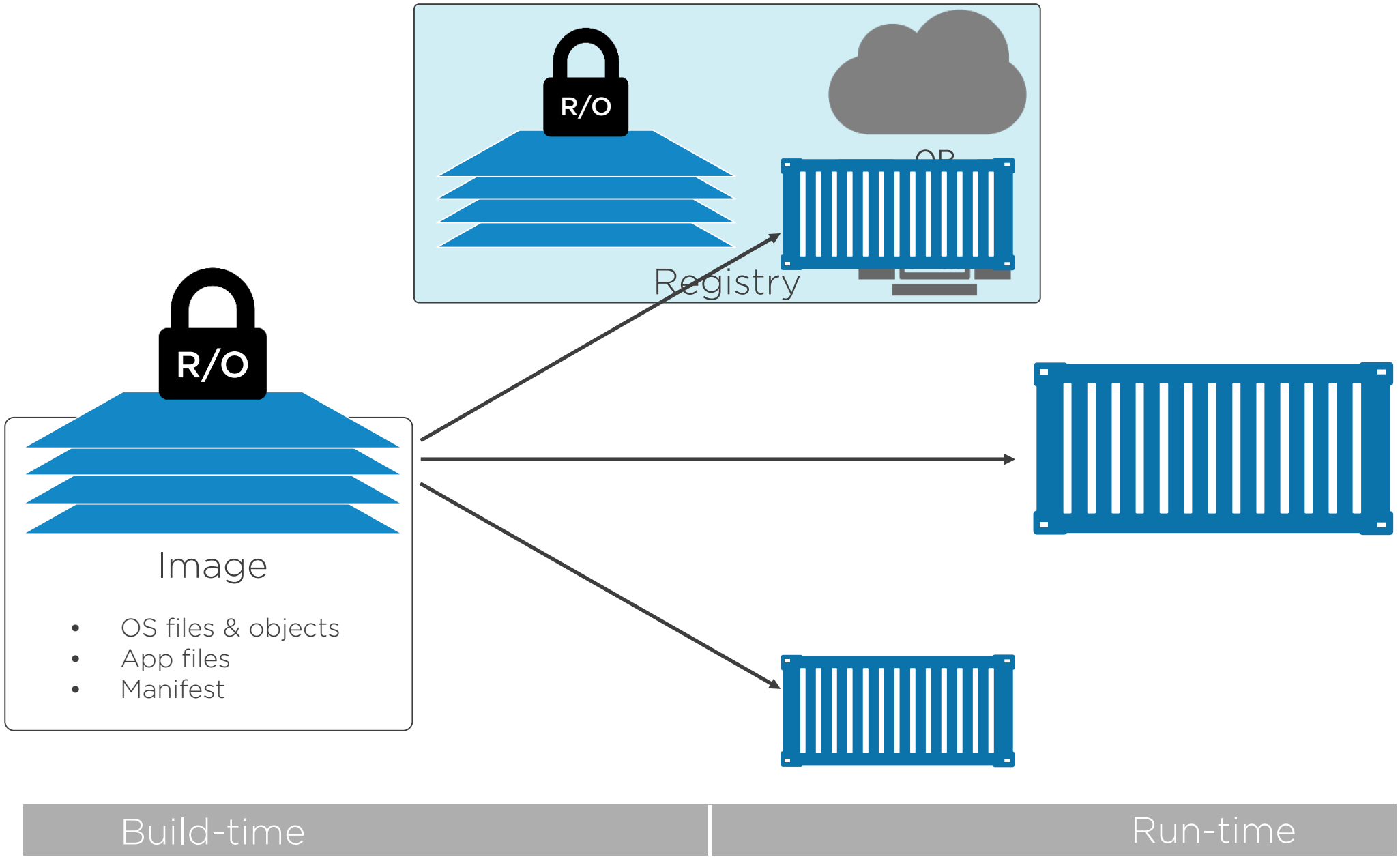
Image

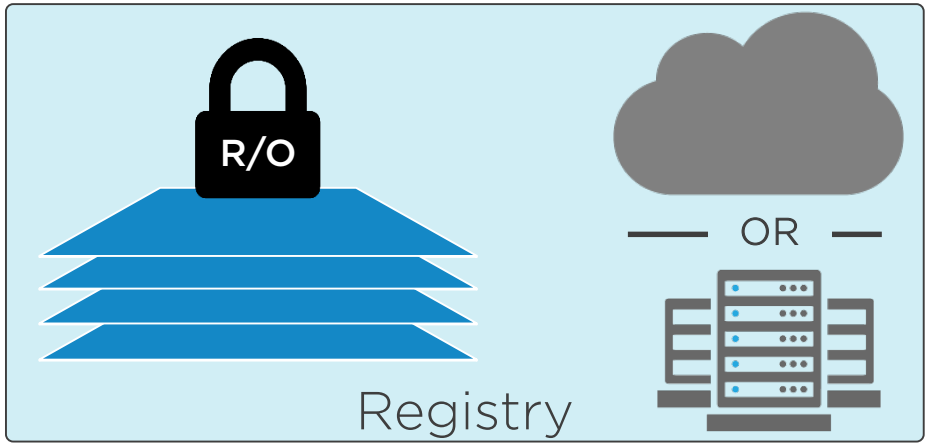
R/O
Image
• OS files & objects
• App files
• Manifest
Build-time
Run-time

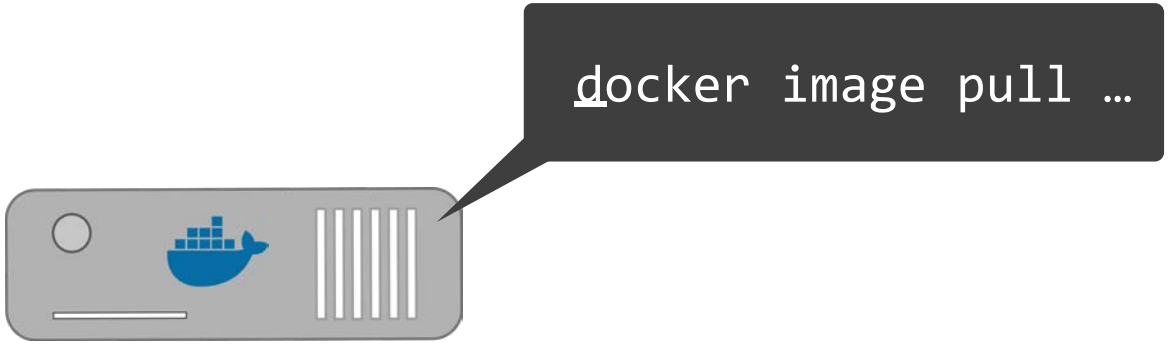
R/O
Image
• OS files & objects
• App files
• Manifest
Build-time
Run-time

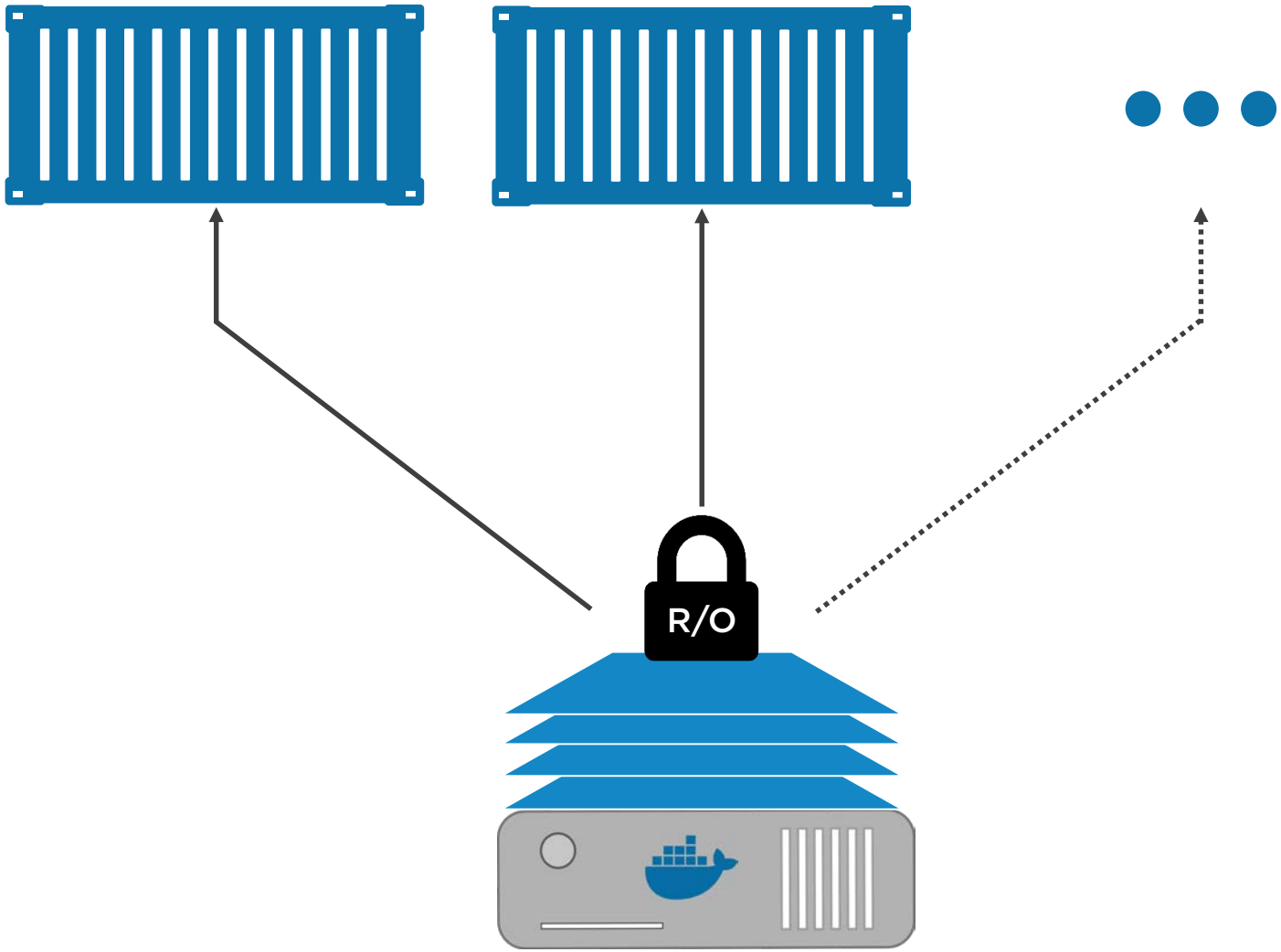

R/O
Image
• OS files & objects
• App files
• Manifest
Build-time
Run-time

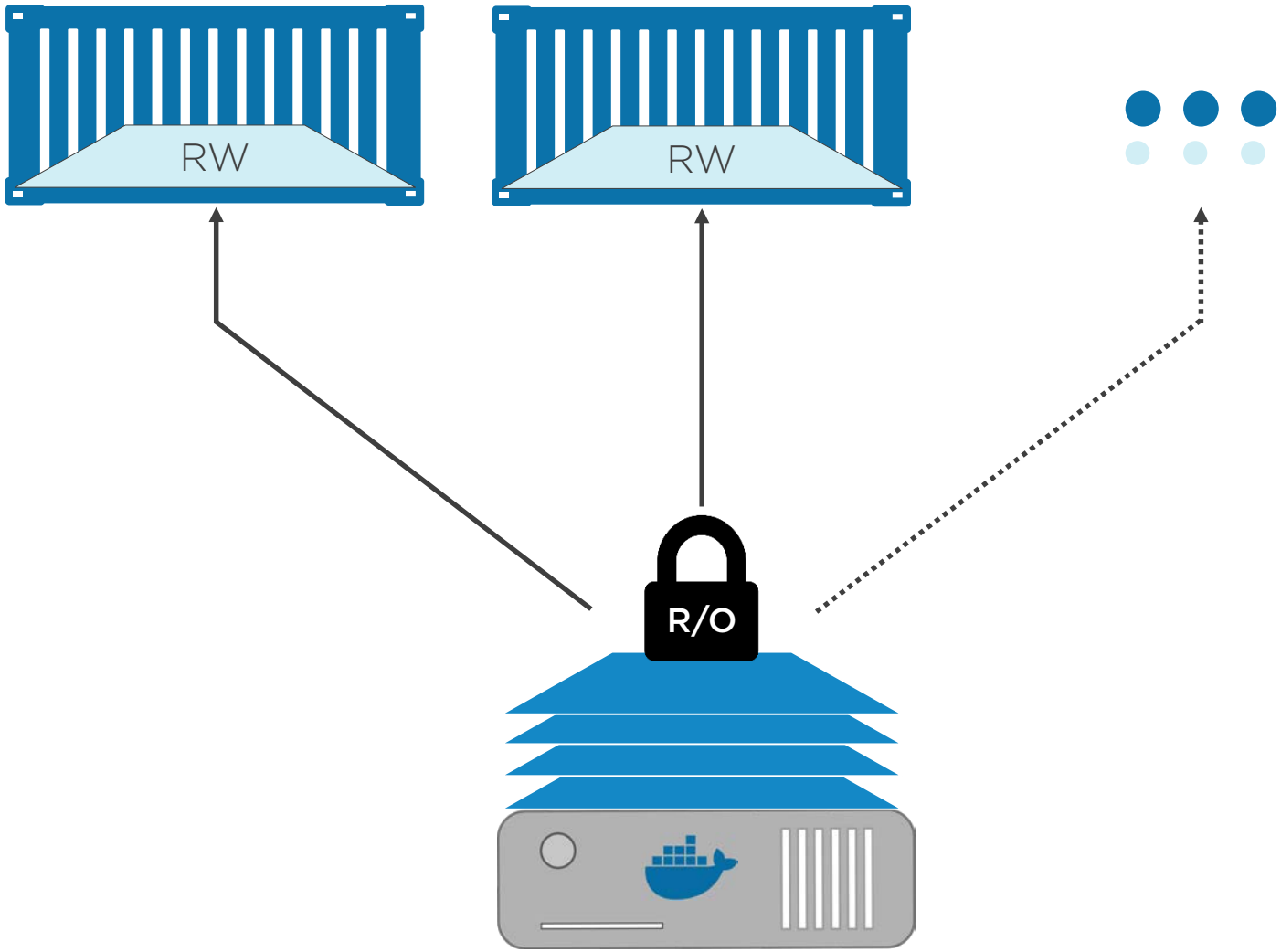

R/O
Image
• OS files & objects
• App files
• Manifest
Build-time
Run-time

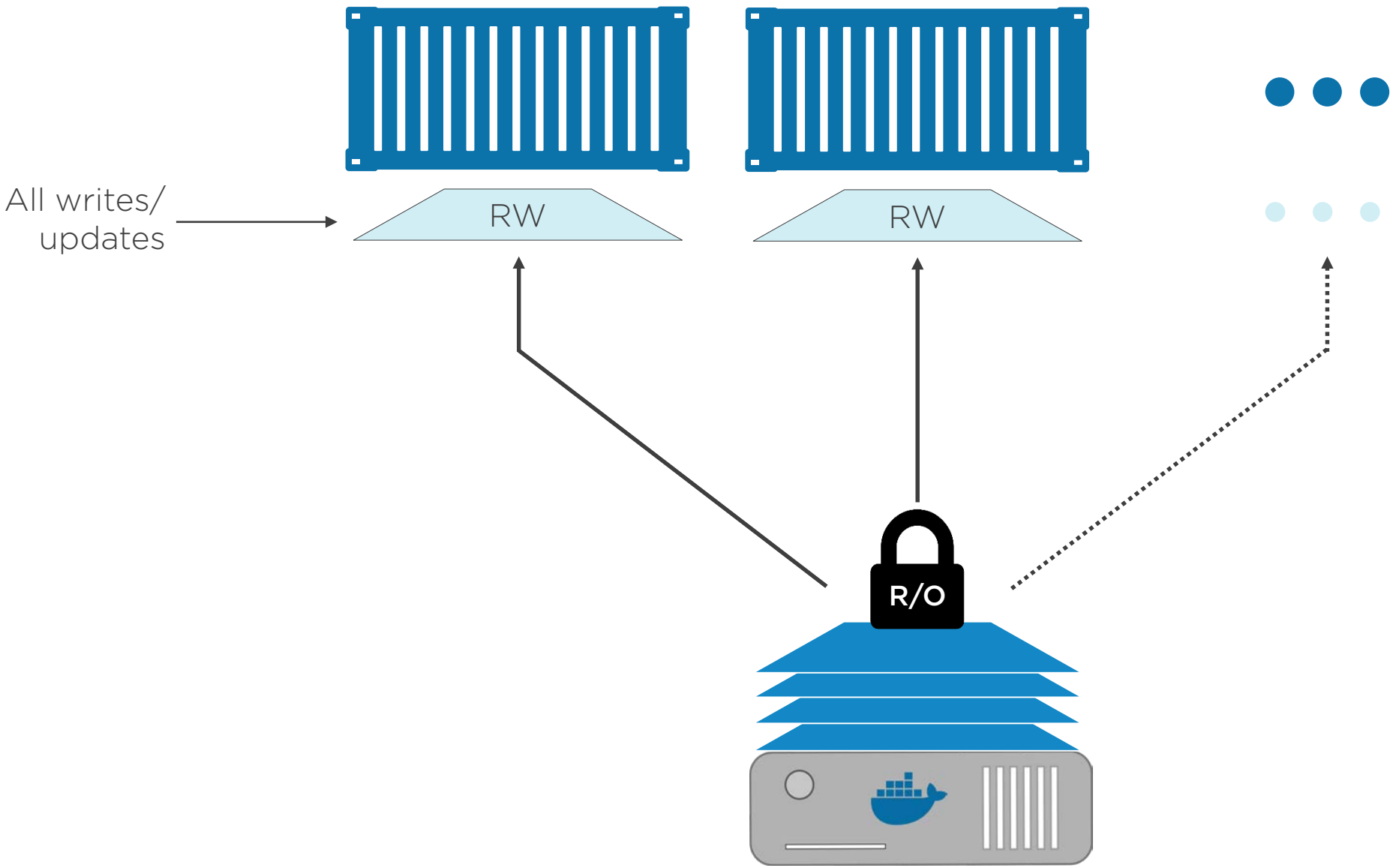

R/O
Registry
R/O
Image
• OS files & objects
• App files
• Manifest
Build-time
Run-time


R/O
OR
Registry


docker image pull …


R/O


RW
RW
R/O


All writes/
updates
RW
RW
R/O

Coming up

The Detail

Images in Detail

Layers - Manifests - Hashes - Drivers

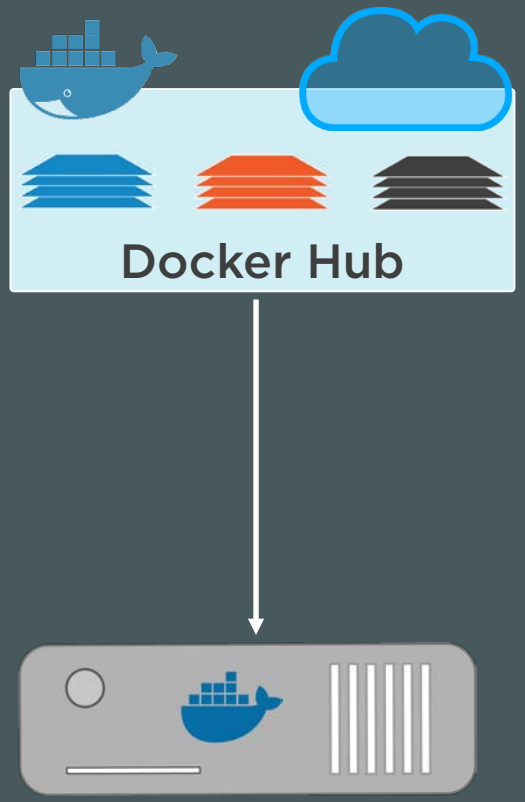

Docker Hub

Image Manifest

```
{
    "schemaVersion": 2,
    "mediaType": "application/vnd.docker.distribution.manifest.v2+json",
    "config": {
        "mediaType": "application/vnd.docker.container.image.v1+json",
        "size": 7023,
        "digest": "sha256:b5b2b2c507a0944348e0303114d8d93aaaa081732b86451d9bce1f432a537bc7"
    },
    "layers": [
        {
            "mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
            "size": 32654,
            "digest": "sha256:e692418e4cbaf90ca69d05a66403747baa33ee08806650b51fab815ad7fc331f"
        },
        {
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            "size": 16724,
            "digest": "sha256:3c3a4604a545cdc127456d94e421cd355bca5b528f4a9c1905b15da2eb4a4c6b"
        },
        {
            "mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
            "size": 73109,
            "digest": "sha256:ec4b8955958665577945c89419d1af06b5f7636b4ac3da7f12184802ad867736"
        }
    ]
}
```

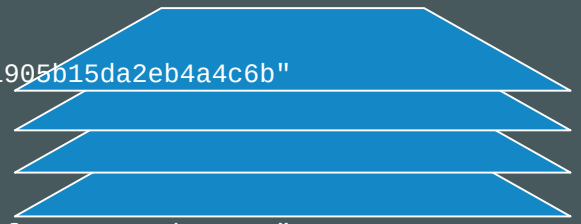

Layers

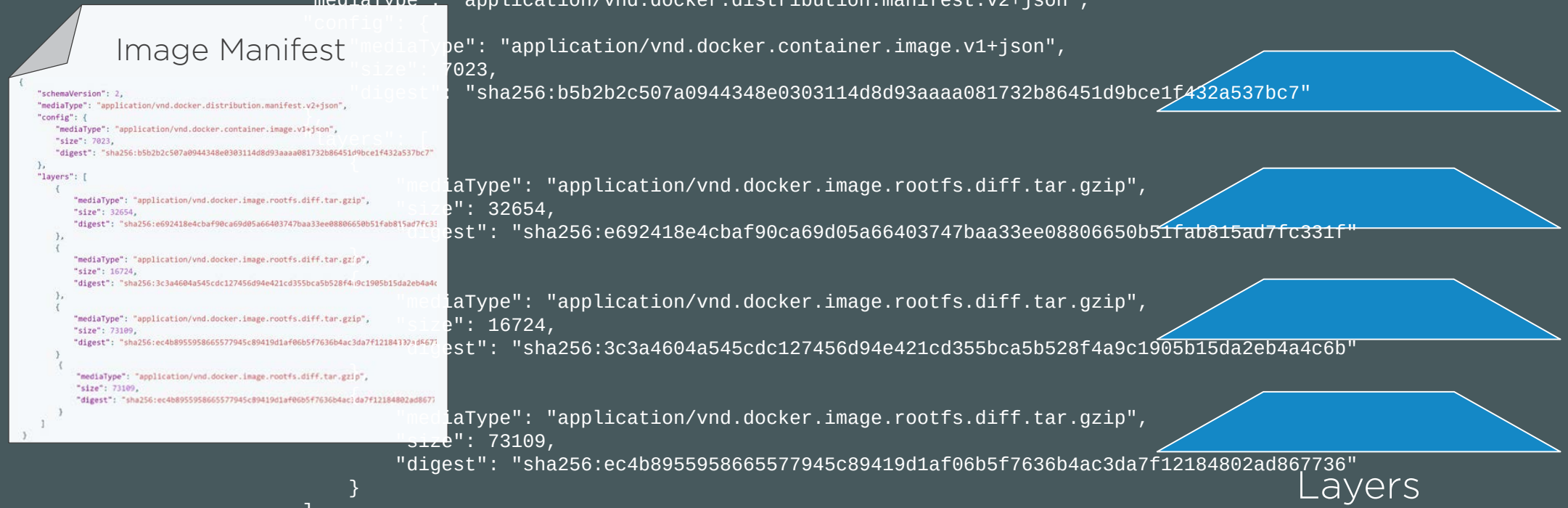
Image Manifest
{
"schemaVersion": 2,
"mediaType": "application/vnd.docker.distribution.manifest.v2+json",
"config": {
"mediaType": "application/vnd.docker.container.image.v1+json",
"size": 7023,
"digest": "sha256:b5b2b2c507a0944348e0303114d8d93aaaa081732b86451d9bce1f432a537bc7"
},
"layers": [
{
"mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
"size": 32654,
"digest": "sha256:e692418e4cbaf90ca69d05a66403747baa33ee08806650b51fab815ad7fc331f"
},
{
"mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
"size": 16724,
"digest": "sha256:3c3a4604a545cdc127456d94e421cd355bca5b528f4a9c1905b15da2eb4a4c6b"
},
{
"mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
"size": 73109,
"digest": "sha256:ec4b8955958665577945c89419d1af06b5f7636b4ac3da7f12184802ad867736"
}
]
}
Layers

Image Manifest


```
{
    "schemaVersion": 2,
    "mediaType": "application/vnd.docker.distribution.manifest.v2+json",
    "config": {
        "mediaType": "application/vnd.docker.container.image.v1+json",
        "size": 7023,
        "digest": "sha256:b5b2b2c507a0944348e0303114d8d93aaaa081732b86451d9bce1f432a537bc7"
    },
    "layers": [
        {
            "mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
            "size": 32654,
            "digest": "sha256:e692418e4cbaf90ca69d05a66403747baa33ee08806650b51fab815ad7fc3
        },
        {
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            "size": 16724,
            "digest": "sha256:3c3a4604a545cdc127456d94e421cd355bca5b528f4a9c1905b15da2eb4a4
        },
        {
            "mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
            "size": 73109,
            "digest": "sha256:ec4b8955958665577945c89419d1af06b5f7636b4ac3da7f12184802ad867
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        {
            "mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
            "size": 73109,
            "digest": "sha256:ec4b8955958665577945c89419d1af06b5f7636b4ac3da7f12184802ad867
        }
    ]
}
```


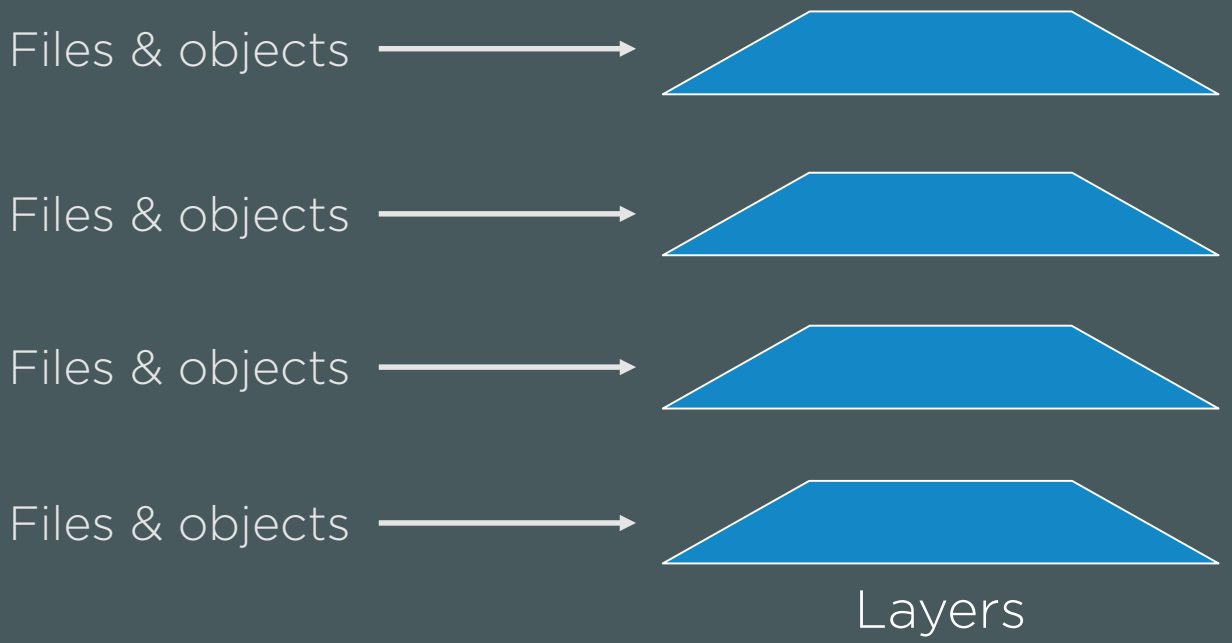

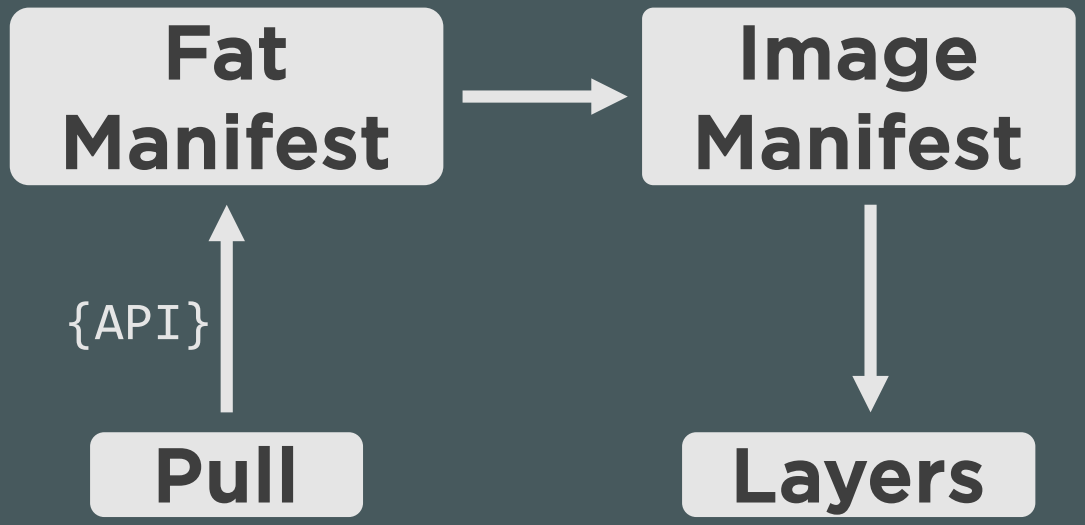
Fat Manifest
Image Manifest
{API}
Pull
Layers

Image Config
R/O
{
"schemaVersion": 2,
"mediaType": "application/vnd.docker.distribution.manifest.v2+json",
"config": {
"mediaType": "application/vnd.docker.container.image.v1+json",
"size": 7023,
"digest": "sha256:b5b2b2c507a0944348e0303114d8d93aaaa081732b86451d9bce1f432a537bc7"
},
"layers": [
{
"mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
"size": 32654,
"digest": "sha256:e692418e4cbaf90ca69d05a66403747baa33ee08806650b51fab815ad7fc3
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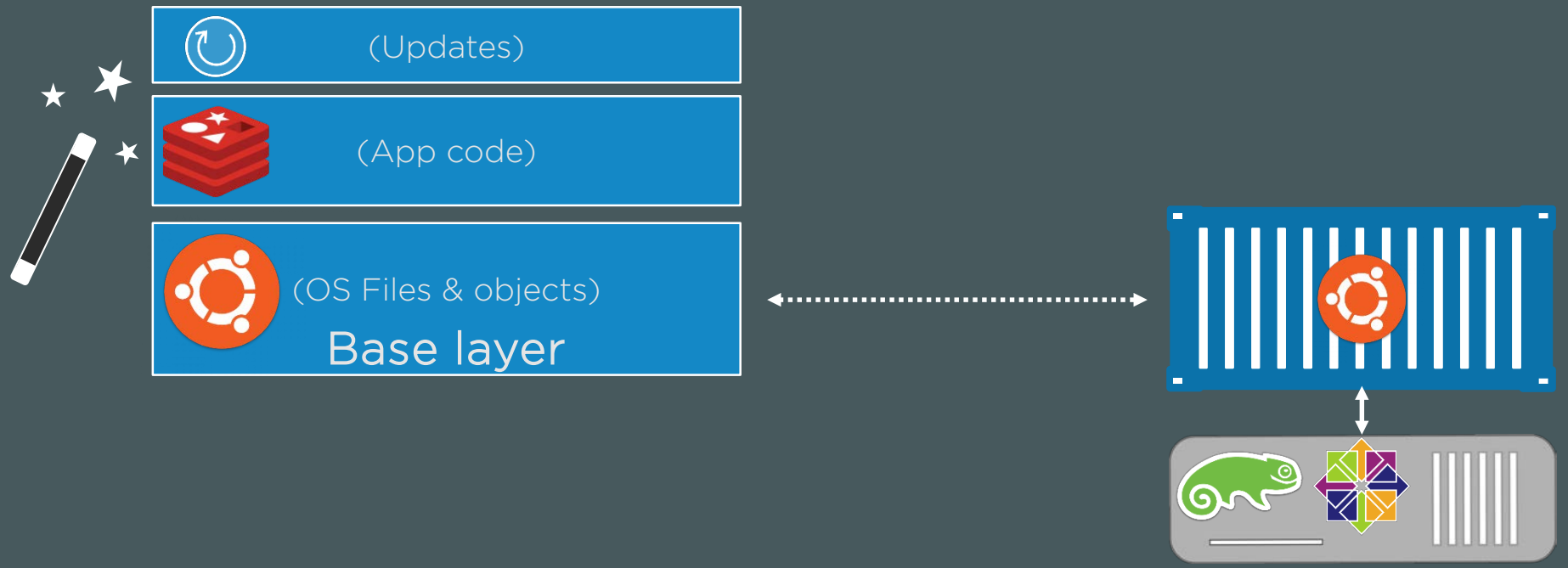
"mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
"size": 16724,
"digest": "sha256:3c3a4604a545cdc127456d94e421cd355bca5b528f4a9c1905b15da2eb4a4
},
{
"mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
"size": 73109,
"digest": "sha256:ec4b8955958665577945c89419d1af06b5f7636b4ac3da7f12184802ad867
}
{
"mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
"size": 73109,
"digest": "sha256:ec4b8955958665577945c89419d1af06b5f7636b4ac3da7f12184802ad867
}
]
}
sha256:d124781fc06a73b05

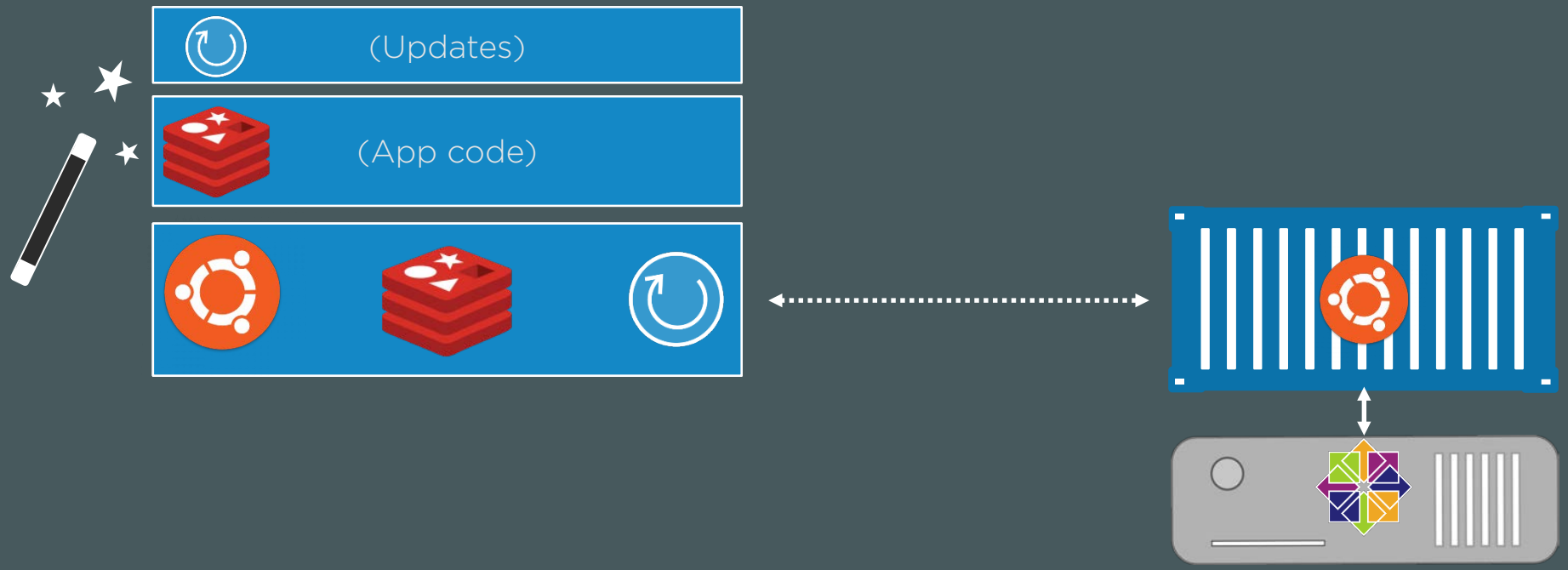
R/O
sha256:9b915a241e29dc276798bb48044
R/O
sha256:5f8bc66fcea8f09004b5cb07
R/O
sha256:2caf8a80130d6e9f4ed22e1e
R/O
sha256:1445a9131f2b28a12ff6396d

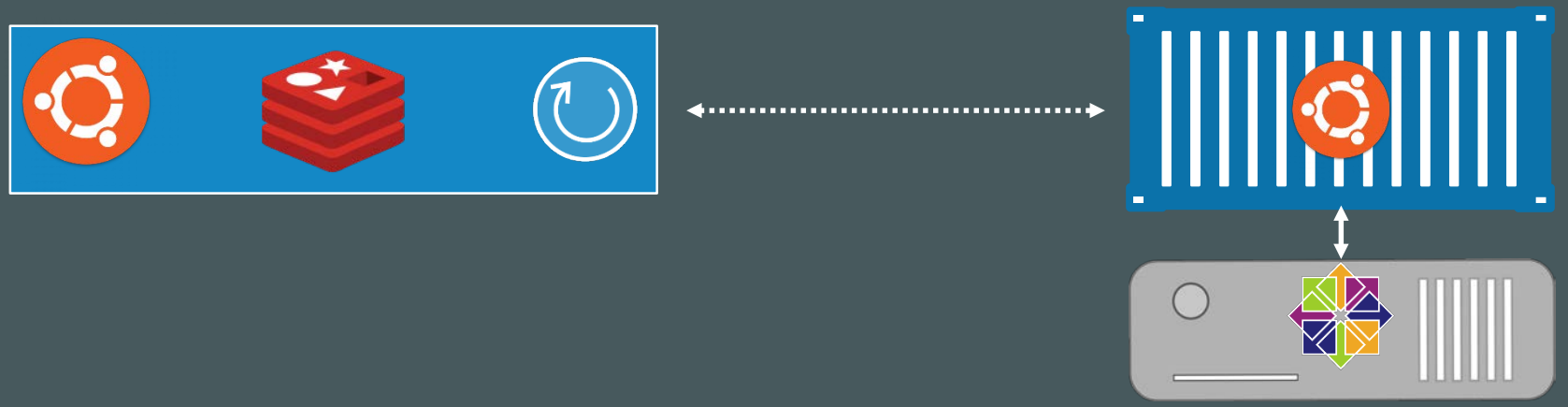
```
{
    "schemaVersion": 2,
    "mediaType": "application/vnd.docker.distribution.manifest.v2+json",
    "config": {
        "mediaType": "application/vnd.docker.container.image.v1+json",
        "size": 7023,
        "digest": "sha256:b5b2b2c507a. . .81732b86451d9bce1f432a537bc7"
    },
    "layers": [
        {
            "mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
            "size": 32654,
            "digest": "sha256:e692418. . .e08806650b51fab815ad7fc331f"
        },
        {
            "mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
            "size": 16724,
            "digest": "sha256:3c3a460. . .f28f4a9c1905b15da2eb4a4c6b"
        },
        {
            "mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
            "size": 73109,
            "digest": "sha256:ec4b895. . .6b4ac3da7f12184802ad867736"
        }
    ]
}
```

(OS Files & objects)
Base layer

(OS Files & objects)
Base layer


(Updates)
(App code)
(OS Files & objects)
Base layer


(Updates)
(App code)

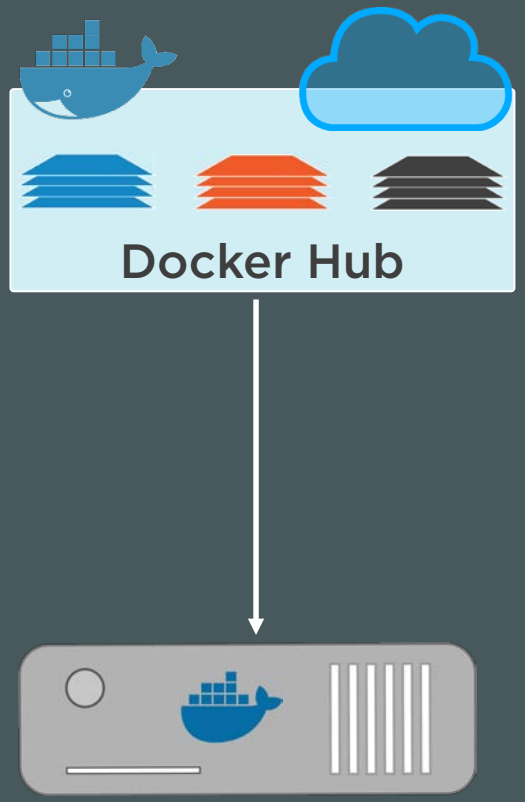


Coming up

Registries

Registries

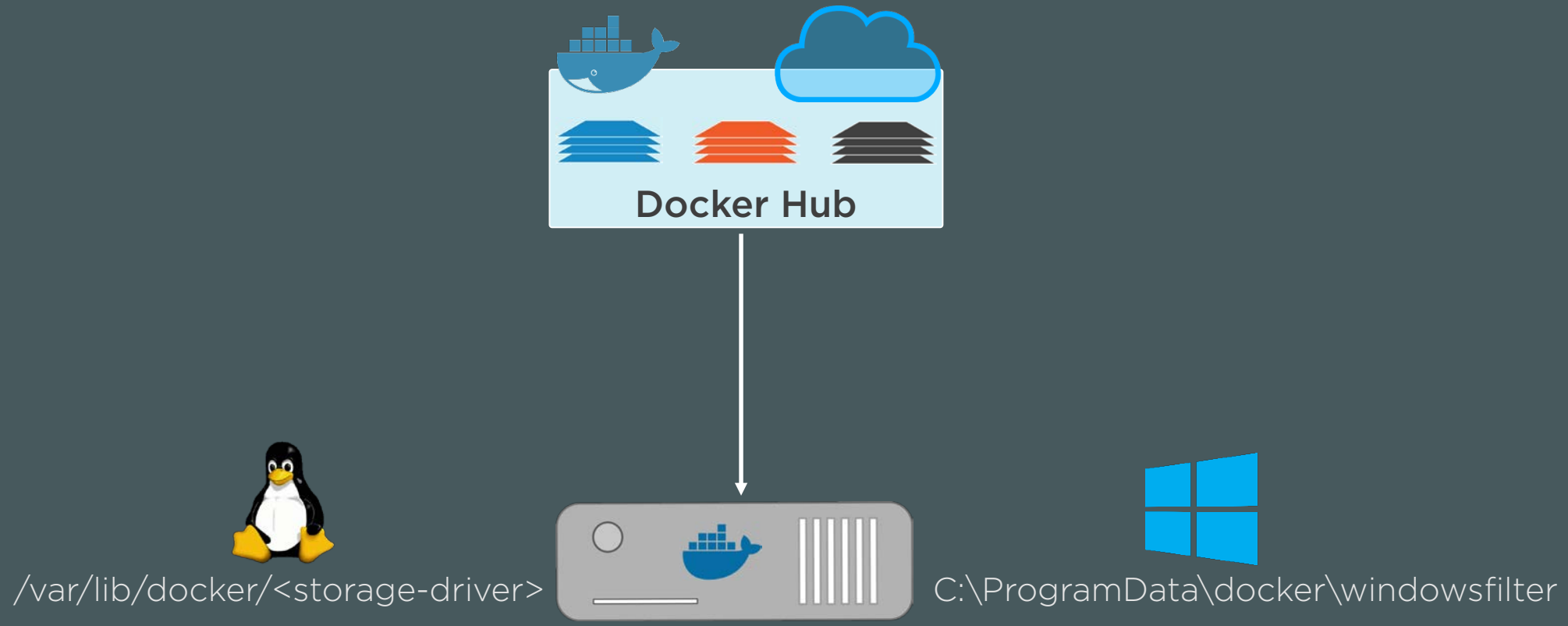
Where images live


Docker Hub

On-premises Registries

Docker Trusted Registry (DTR)

Plus others from the ecosystem...


Docker Hub
/var/lib/docker/<storage-driver>
C:\ProgramData\docker\windowsfilter

```
docker.io/redis

docker.io/nginx
```

REGISTRY / REPO / IMAGE (TAG)

docker.io/redis/latest

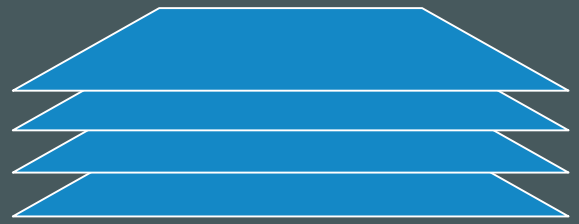
docker.io/nginx/1.13.5

docker.io/<repo>/**latest**

(default) (default)

Image Manifest


```
{
    "schemaVersion": 2,
    "mediaType": "application/vnd.docker.distribution.manifest.v2+json",
    "config": {
        "mediaType": "application/vnd.docker.container.image.v1+json",
        "size": 7023,
        "digest": "sha256:b5b2b2c507a0944348e0303114d8d93aaaa081732b86451d9bce1f432a537bc7"
    },
    "layers": [
        {
            "mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
            "size": 32654,
            "digest": "sha256:e692418e4cbaf90ca69d05a66403747baa33ee08806650b51fab815ad7fc3
        },
        {
            "mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
            "size": 16724,
            "digest": "sha256:3c3a4604a545cdc127456d94e421cd355bca5b528f4a9c1905b15da2eb4a4
        },
        {
            "mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
            "size": 73109,
            "digest": "sha256:ec4b8955958665577945c89419d1af06b5f7636b4ac3da7f12184802ad867
        }
        {
            "mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
            "size": 73109,
            "digest": "sha256:ec4b8955958665577945c89419d1af06b5f7636b4ac3da7f12184802ad867
        }
    ]
}
```

Layers

Content hashes

Image Config
R/O
{
"schemaVersion": 2,
"mediaType": "application/vnd.docker.distribution.manifest.v2+json",
"config": {
"mediaType": "application/vnd.docker.container.image.v1+json",
"size": 7023,
"digest": "sha256:b5b2b2c507a0944348e0303114d8d93aaaa081732b86451d9bce1f432a537bc7"
},
"layers": [
{
"mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
"size": 32654,
"digest": "sha256:e692418e4cbaf90ca69d05a66403747baa33ee08806650b51fab815ad7fc3
},
{
"mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
"size": 16724,
"digest": "sha256:3c3a4604a545cdc127456d94e421cd355bca5b528f4a9c1905b15da2eb4a4
},
{
"mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
"size": 73109,
"digest": "sha256:ec4b8955958665577945c89419d1af06b5f7636b4ac3da7f12184802ad867
}
{
"mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
"size": 73109,
"digest": "sha256:ec4b8955958665577945c89419d1af06b5f7636b4ac3da7f12184802ad867
}
]
}
sha256:d124781fc06a73b05
R/O
sha256:9b915a241e29dc276798bb48044
R/O
sha256:5f8bc66fcea8f09004b5cb07886
R/O
sha256:2caf8a80130d6e9f4ed22e1ec1c
R/O
sha256:1445a9131f2b28a12ff6396de32
Registry
Content hashes

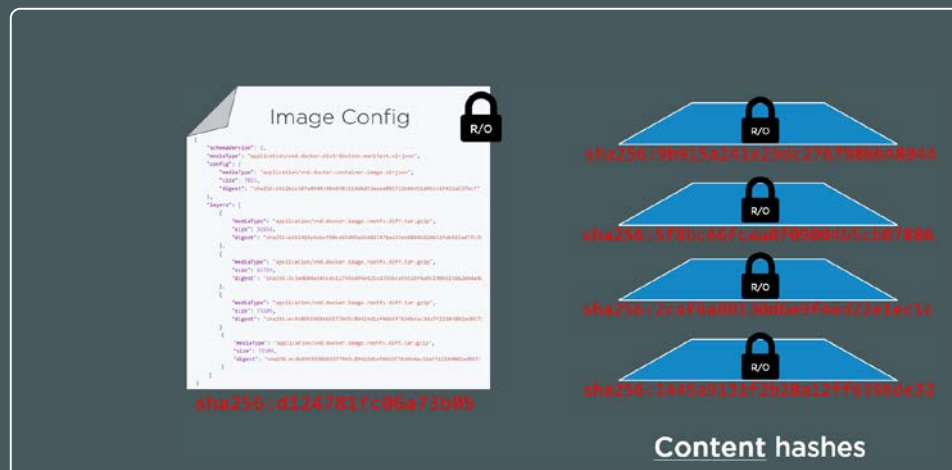


Image Config
R/O
sha256:d1247817c86a73b85
R/O
R/O
R/O
R/O
Content hashes
Registry

Distribution hashes

Registry

Image Config
R/O
sha256:71cab1f406a75b0a
R/O
sha256:798bb480449b915a241e29dc276
R/O
sha256:cb078865f8bc66fcea8f09004b5
R/O
sha256:e1ec1c2caf8a80130d6e9f4ed22
R/O
sha256:31f2b281445a91a12ff6396de32
Distribution hashes
Registry

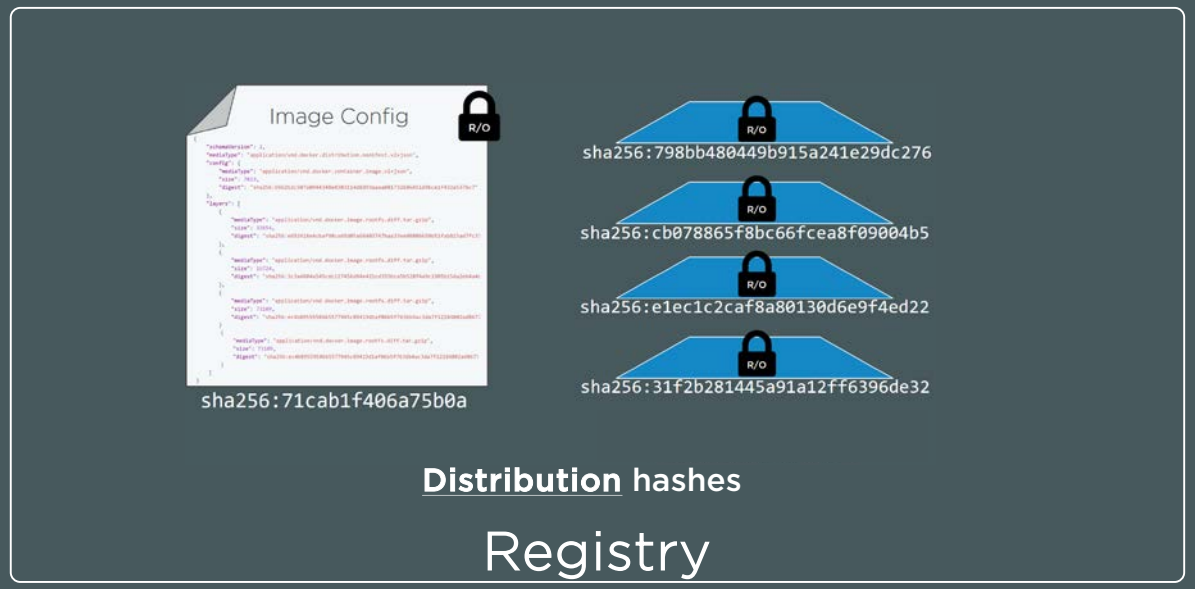
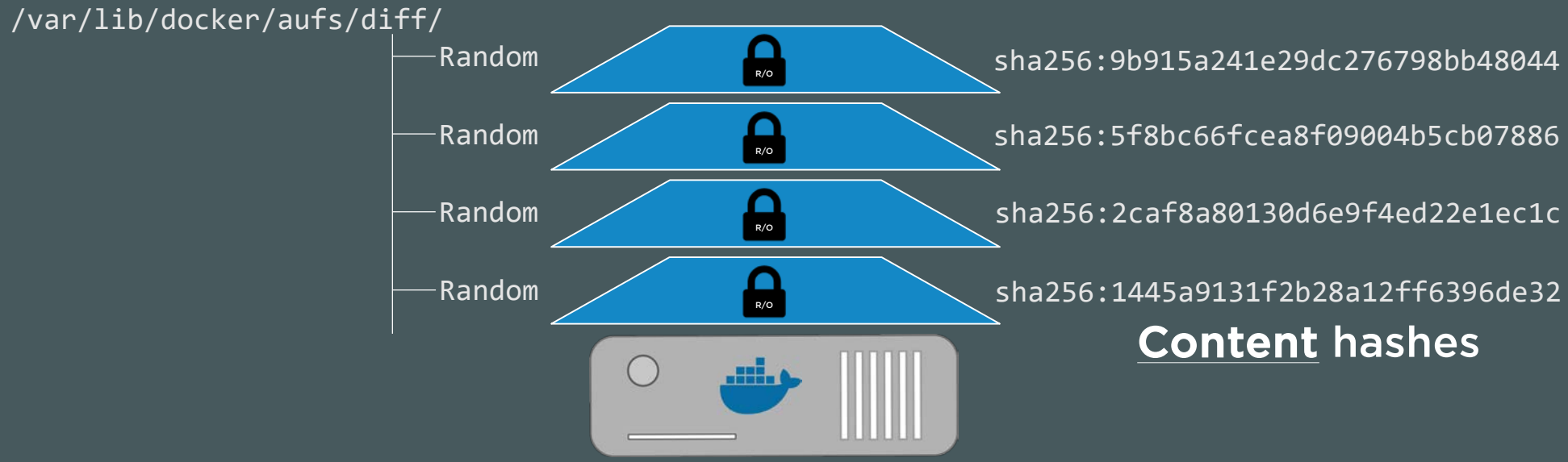
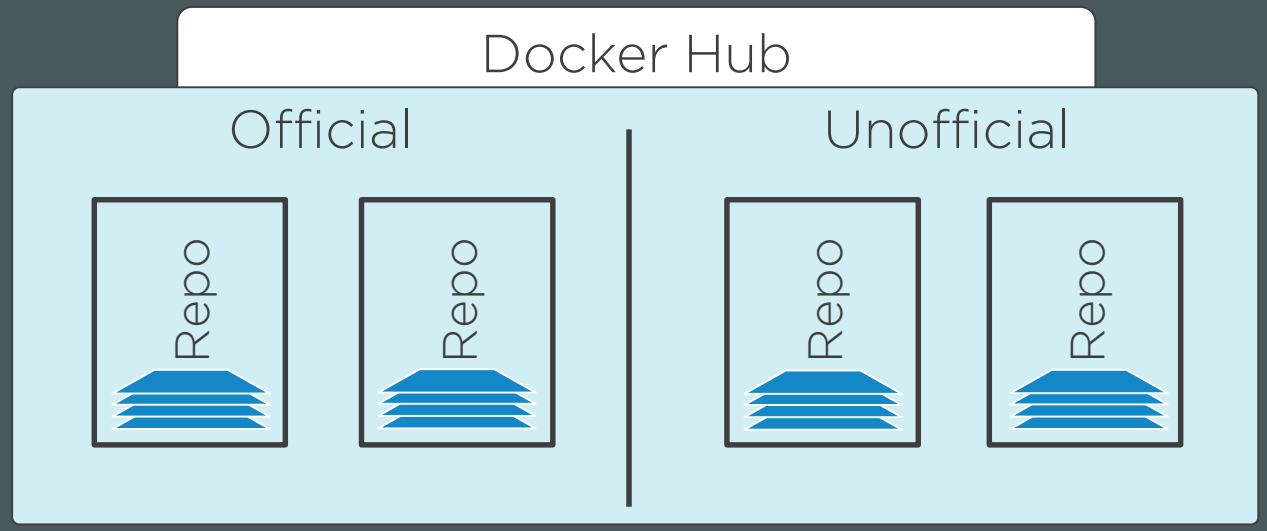
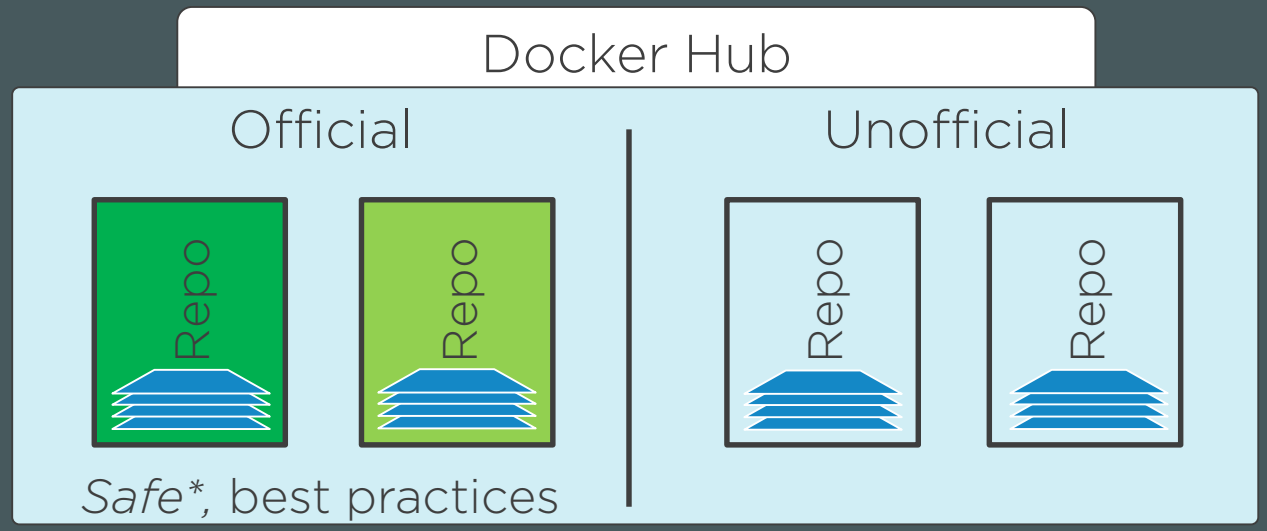
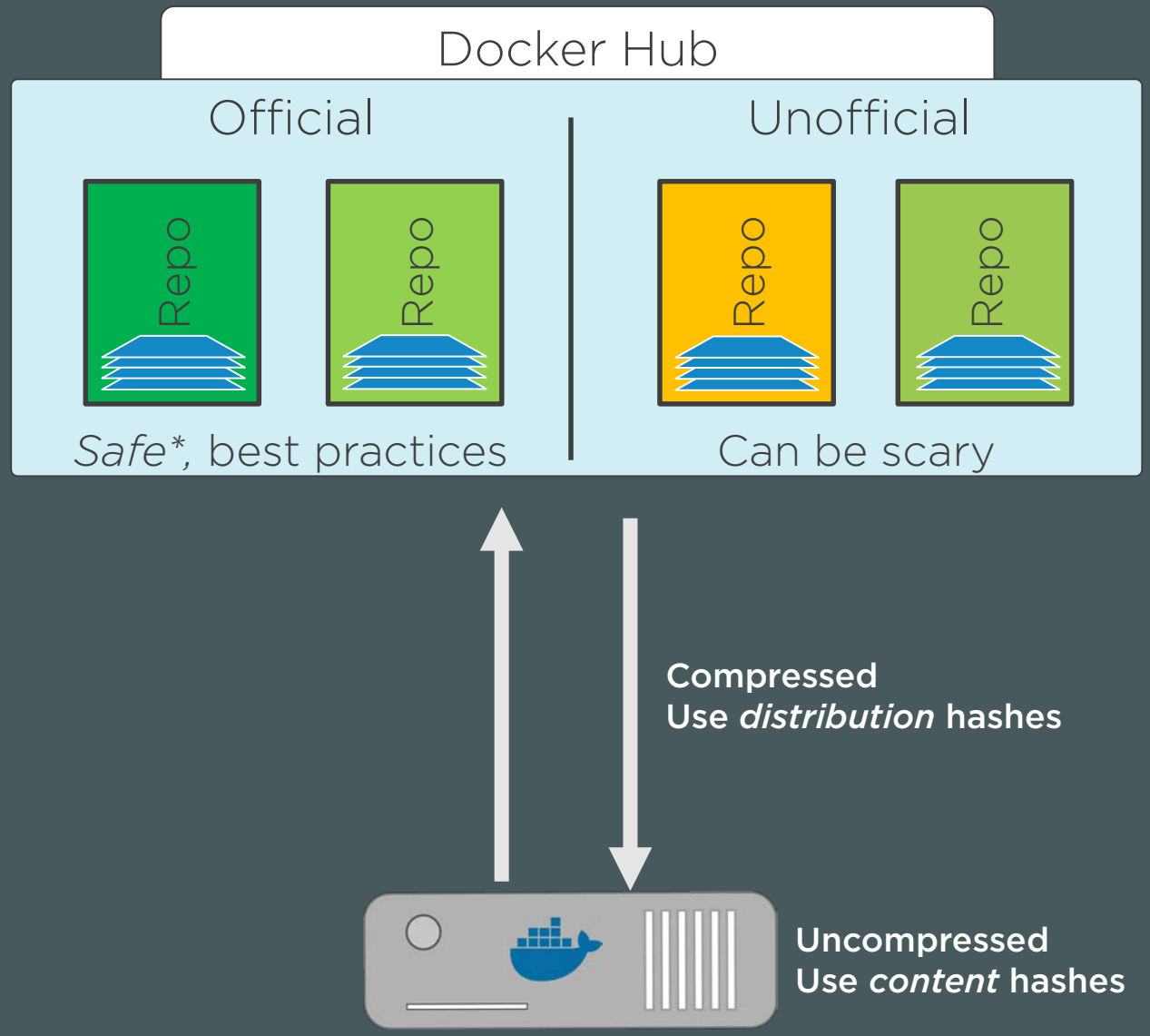


Image Config
R/O
sha256:71cab1f406a75b0a
R/O
sha256:798bb480449b915a241e29dc276
R/O
sha256:cb078865f8bc66fcea8f09004b5
R/O
sha256:e1ec1c2caf8a80130d6e9f4ed22
R/O
sha256:31f2b281445a91a12ff6396de32
Distribution hashes
Registry


/var/lib/docker/aufs/diff/
Random
Random
Random
Random
R/O
R/O
R/O
R/O
sha256:9b915a241e29dc276798bb48044
sha256:5f8bc66fcea8f09004b5cb07886
sha256:2caf8a80130d6e9f4ed22e1ec1c
sha256:1445a9131f2b28a12ff6396de32
Content hashes


Docker Hub
Official
Repo
Repo
Unofficial
Repo
Repo


Docker Hub
Official
Unofficial
Repo
Repo
Repo
Repo
*Safe**, best practices


Docker Hub
Official
Unofficial
Repo
Repo
Repo
Repo
*Safe**, best practices
Can be scary
Compressed
Use *distribution* hashes
Uncompressed
Use *content* hashes

Coming up

Best Practices

A Few Best Practices

Making your life easier

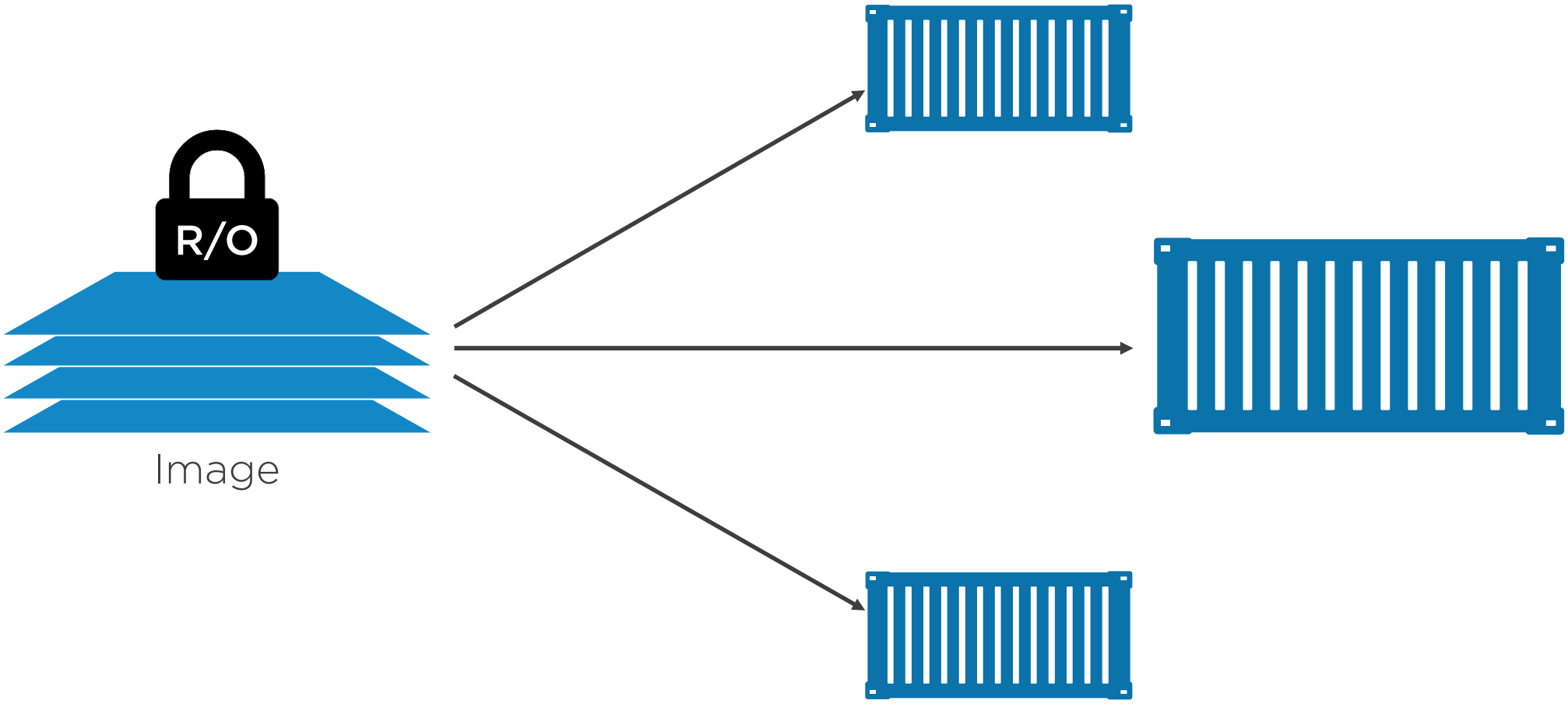
Coming up

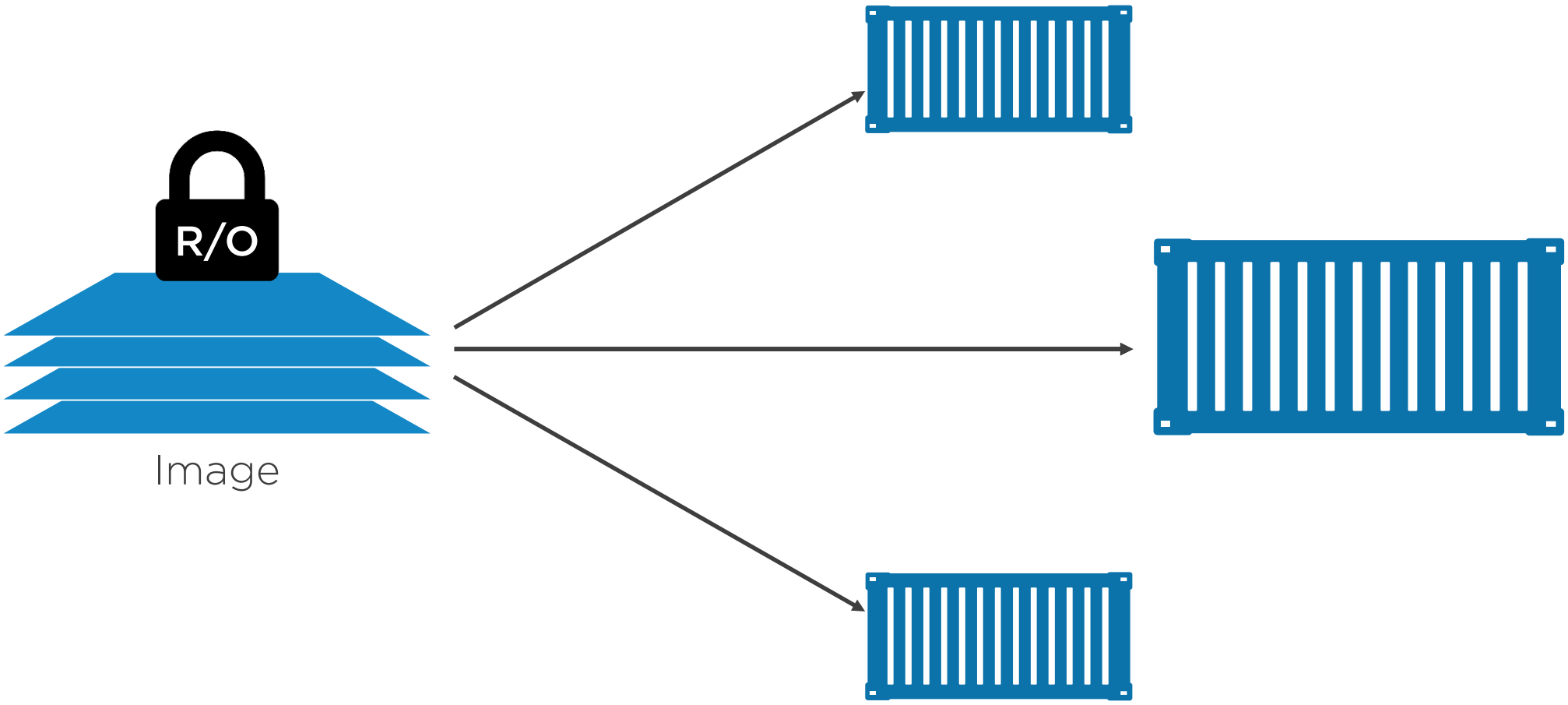
Recap

Uber Recap

All that stuff you already forgot

Image


R/O
Image


R/O
Image

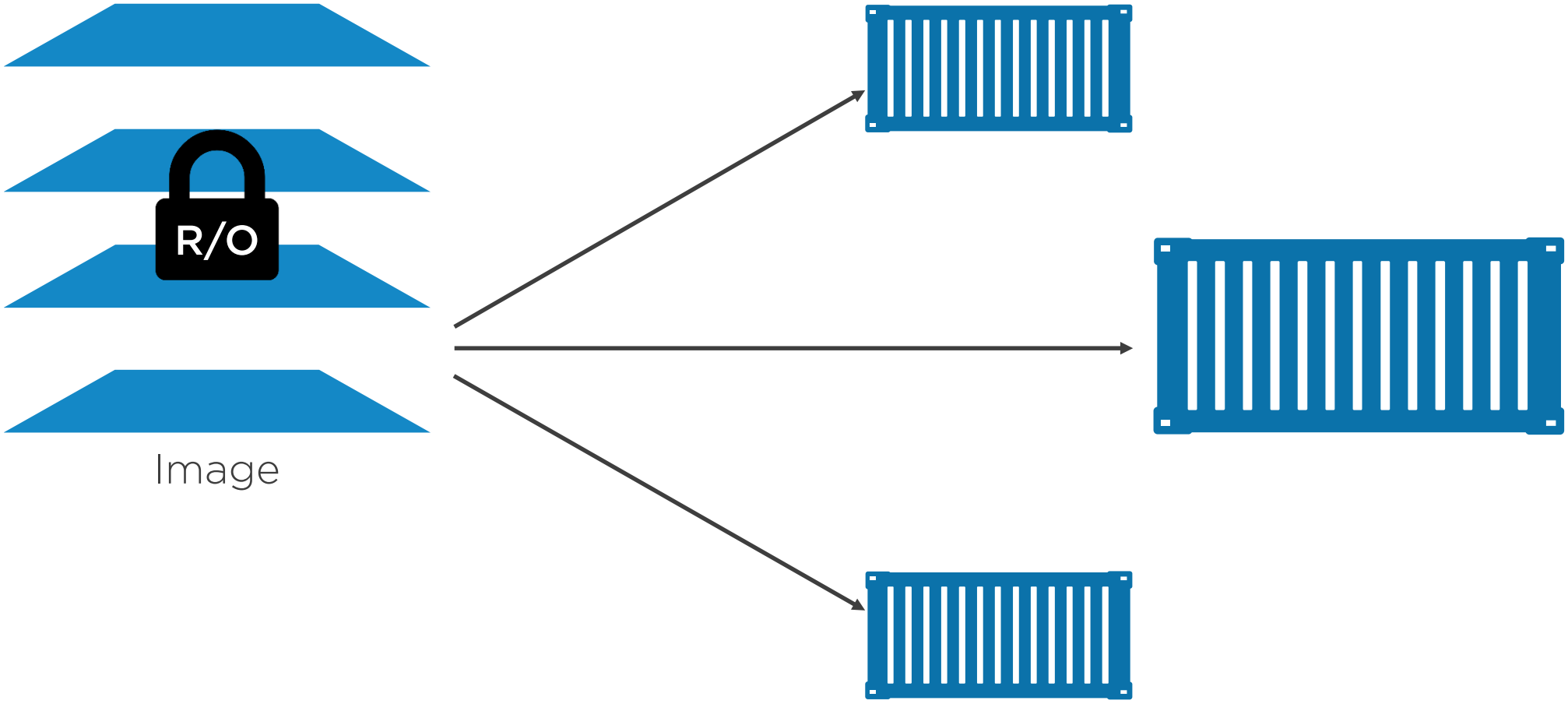

R/O
Image

Image Manifest


```
{
    "schemaVersion": 2,
    "mediaType": "application/vnd.docker.distribution.manifest.v2+json",
    "config": {
        "mediaType": "application/vnd.docker.container.image.v1+json",
        "size": 7023,
        "digest": "sha256:b5b2b2c507a0944348e0303114d8d93aaaa081732b86451d9bce1f432a537bc7"
    },
    "layers": [
        {
            "mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
            "size": 32654,
            "digest": "sha256:e692418e4cbaf90ca69d05a66403747baa33ee08806650b51fab815ad7fc3
        },
        {
            "mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
            "size": 16724,
            "digest": "sha256:3c3a4604a545cdc127456d94e421cd355bca5b528f4a9c1905b15da2eb4a4
        },
        {
            "mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
            "size": 73109,
            "digest": "sha256:ec4b8955958665577945c89419d1af06b5f7636b4ac3da7f12184802ad867
        }
        {
            "mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
            "size": 73109,
            "digest": "sha256:ec4b8955958665577945c89419d1af06b5f7636b4ac3da7f12184802ad867
        }
    ]
}
```

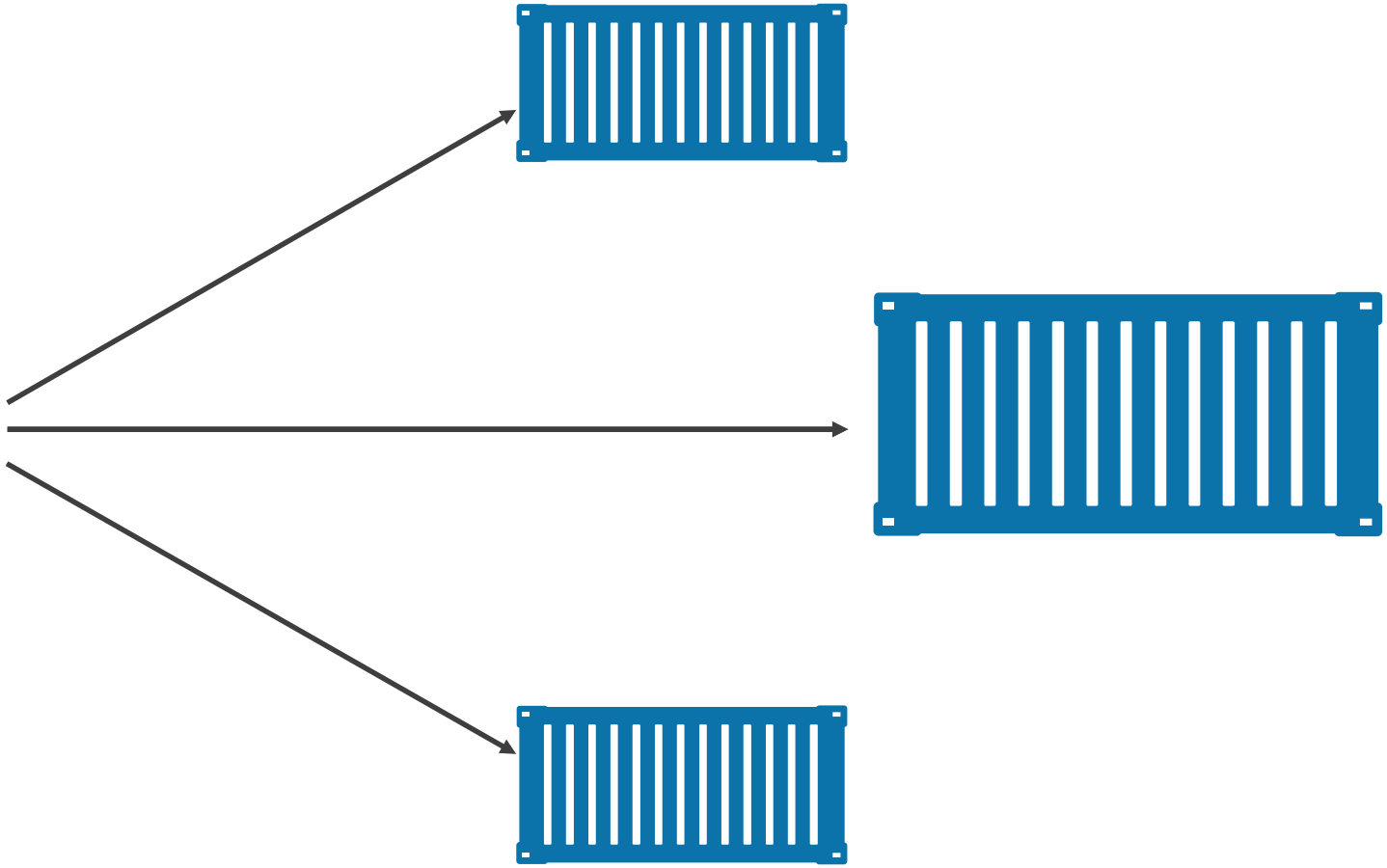



Image Manifest


```
{
    "schemaVersion": 2,
    "mediaType": "application/vnd.docker.distribution.manifest.v2+json",
    "config": {
        "mediaType": "application/vnd.docker.container.image.v1+json",
        "size": 7023,
        "digest": "sha256:b5b2b2c507a0944348e0303114d8d93aaaa081732b86451d9bce1f432a537bc7"
    },
    "layers": [
        {
            "mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
            "size": 32654,
            "digest": "sha256:e692418e4cbaf90ca69d05a66403747baa33ee08806650b51fab815ad7fc3
        },
        {
            "mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
            "size": 16724,
            "digest": "sha256:3c3a4604a545cdc127456d94e421cd355bca5b528f4a9c1905b15da2eb4a4
        },
        {
            "mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
            "size": 73109,
            "digest": "sha256:ec4b8955958665577945c89419d1af06b5f7636b4ac3da7f12184802ad867
        }
        {
            "mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
            "size": 73109,
            "digest": "sha256:ec4b8955958665577945c89419d1af06b5f7636b4ac3da7f12184802ad867
        }
    ]
}
```

Layers

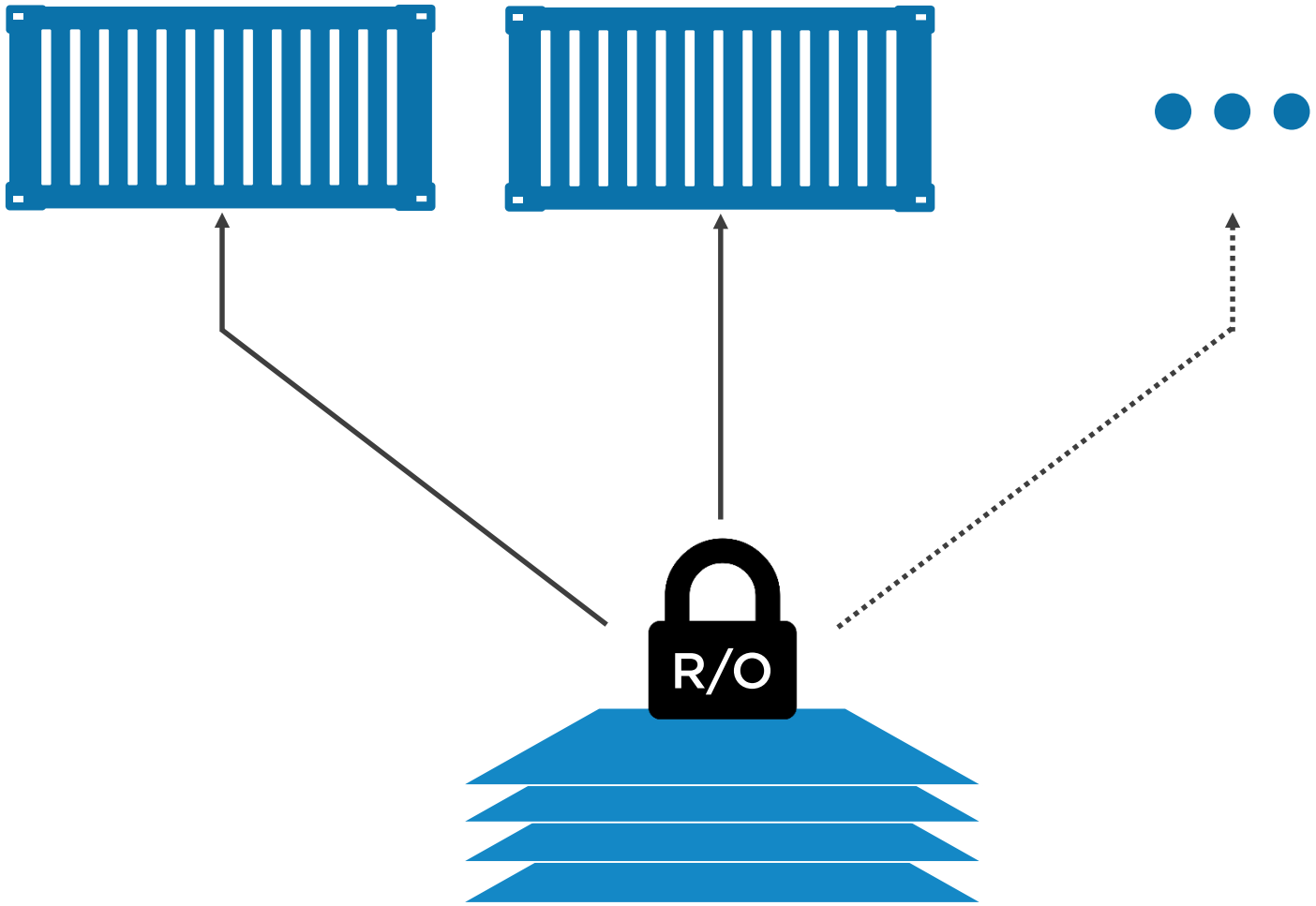
Metadata	Data

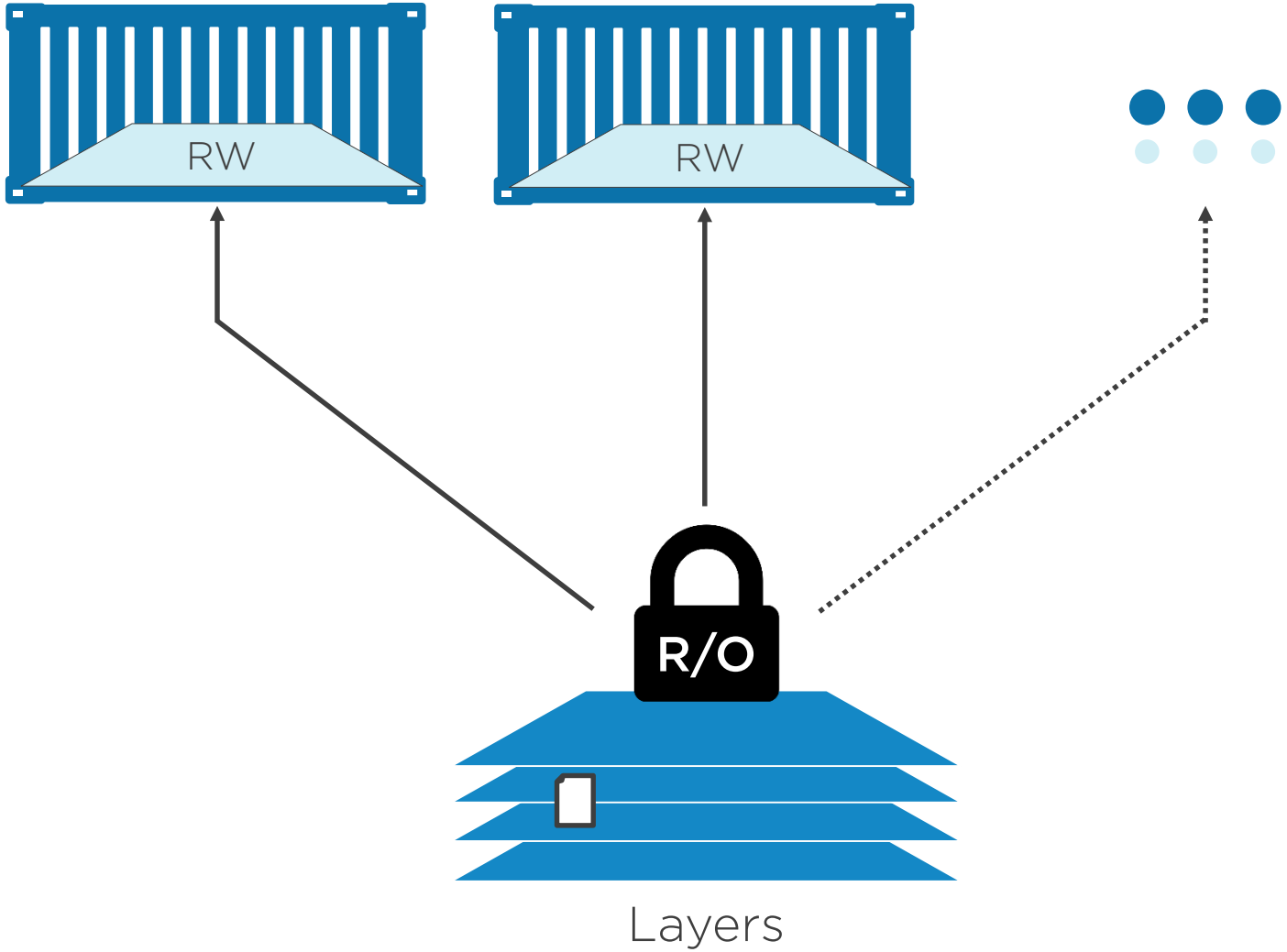
Image Manifest

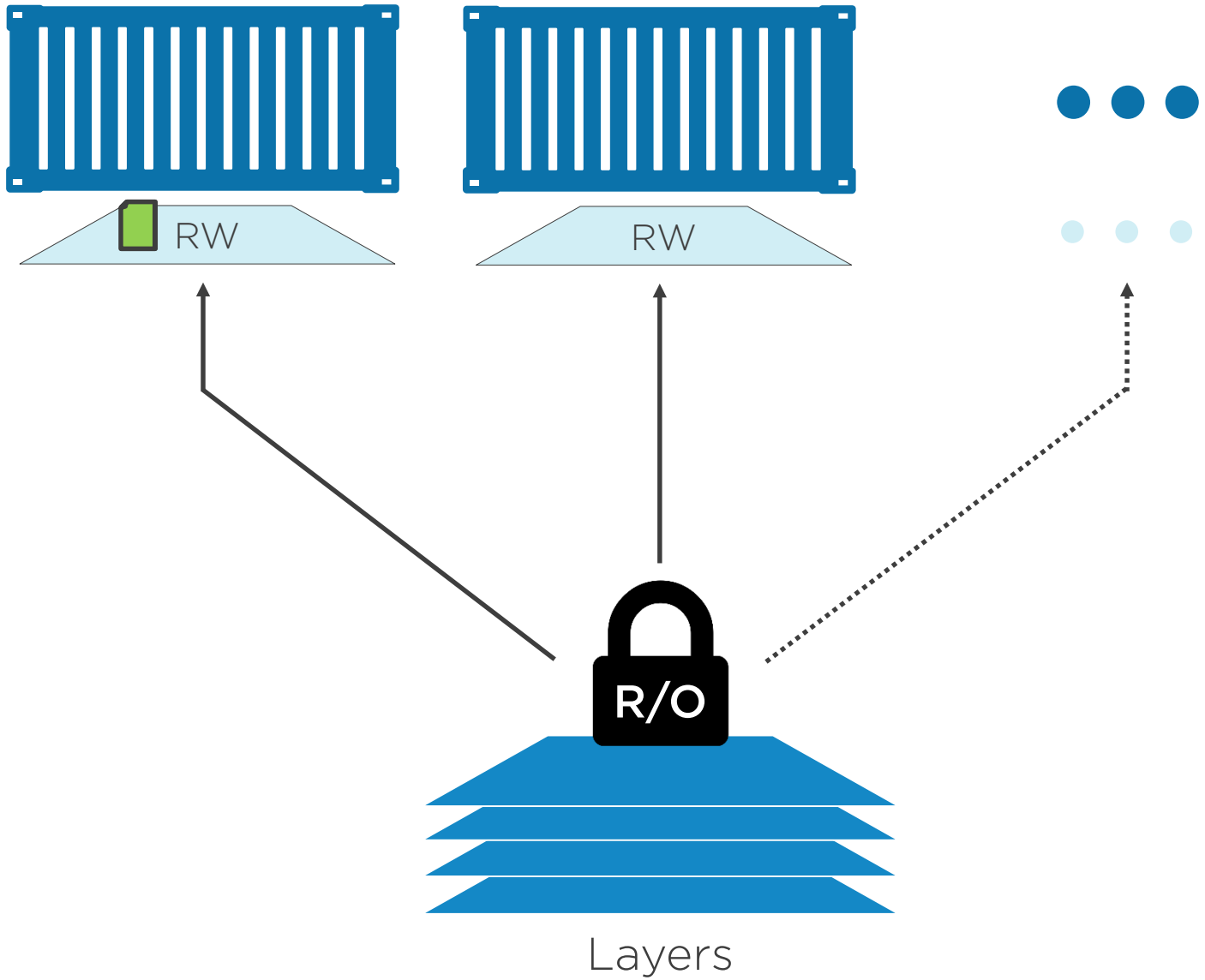

```
{
    "schemaVersion": 2,
    "mediaType": "application/vnd.docker.distribution.manifest.v2+json",
    "config": {
        "mediaType": "application/vnd.docker.container.image.v1+json",
        "size": 7023,
        "digest": "sha256:b5b2b2c507a0944348e0303114d8d93aaaa081732b86451d9bce1f432a537bc7"
    },
    "layers": [
        {
            "mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
            "size": 32654,
            "digest": "sha256:e692418e4cbaf90ca69d05a66403747baa33ee08806650b51fab815ad7fc3
        },
        {
            "mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
            "size": 16724,
            "digest": "sha256:3c3a4604a545cdc127456d94e421cd355bca5b528f4a9c1905b15da2eb4a4
        },
        {
            "mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
            "size": 73109,
            "digest": "sha256:ec4b8955958665577945c89419d1af06b5f7636b4ac3da7f12184802ad867
        }
        {
            "mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
            "size": 73109,
            "digest": "sha256:ec4b8955958665577945c89419d1af06b5f7636b4ac3da7f12184802ad867
        }
    ]
}
```

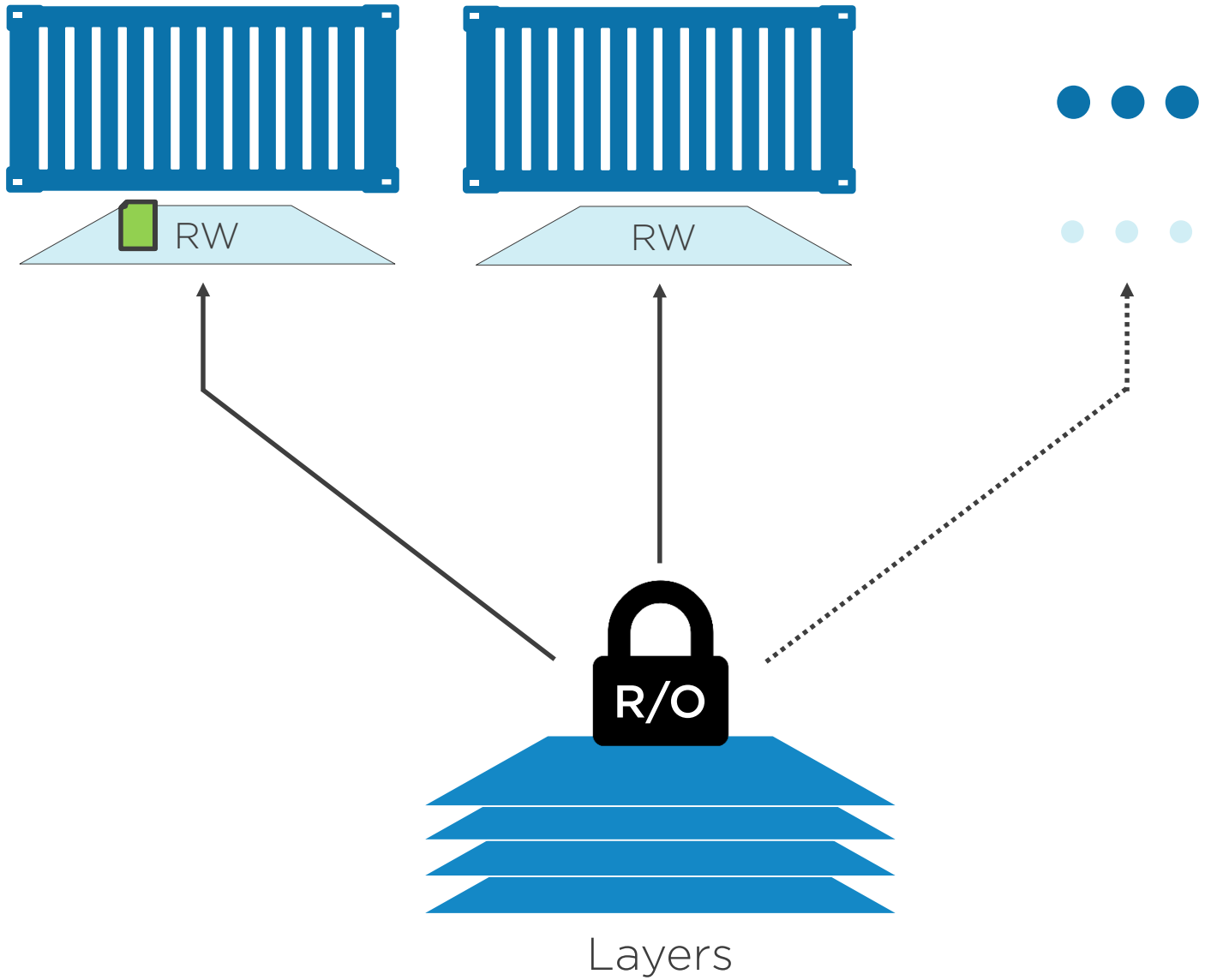
Layers

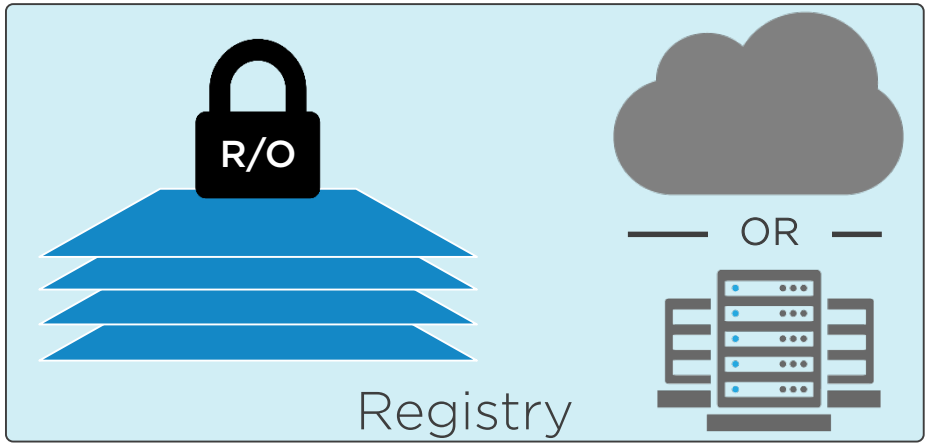
Metadata	Data

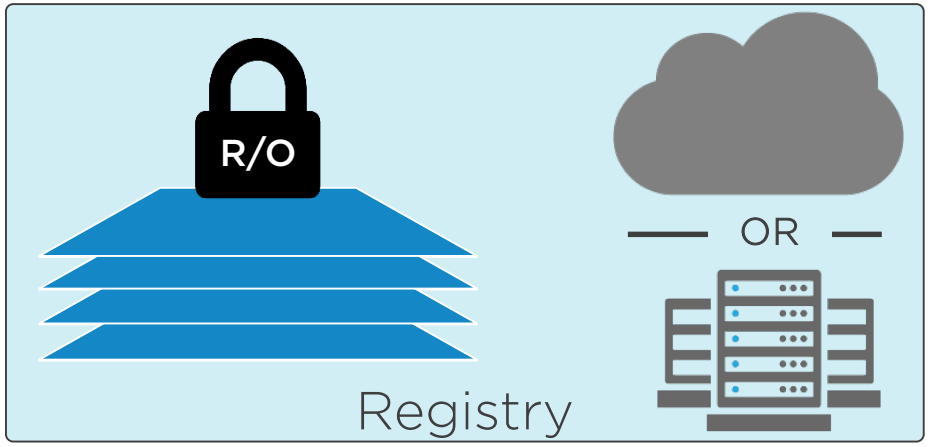

R/O
Layers

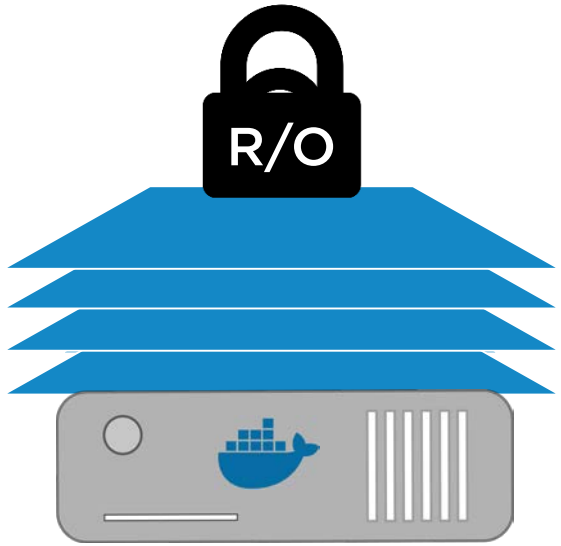

RW
RW
R/O
Layers

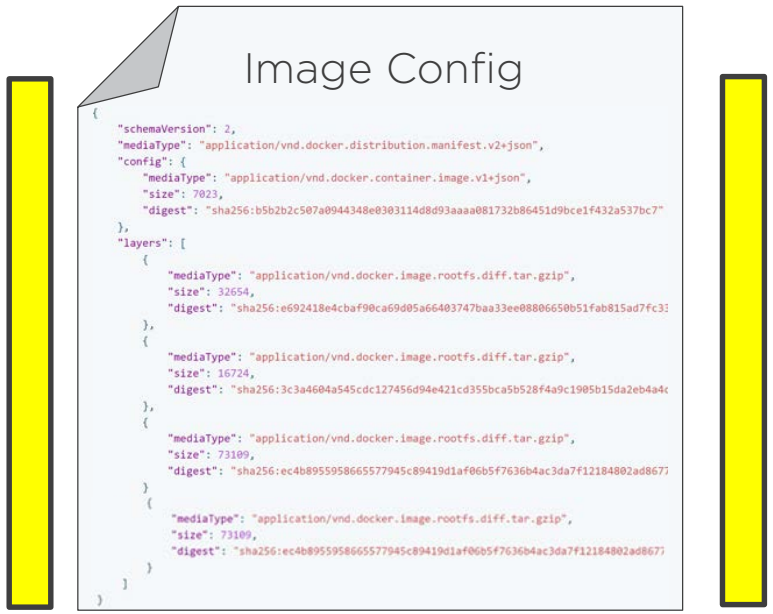

RW
RW
R/O
Layers


RW
RW
R/O
Layers


R/O
OR
Registry


R/O
OR
Registry


R/O



sha256:d124781fc06a73b05

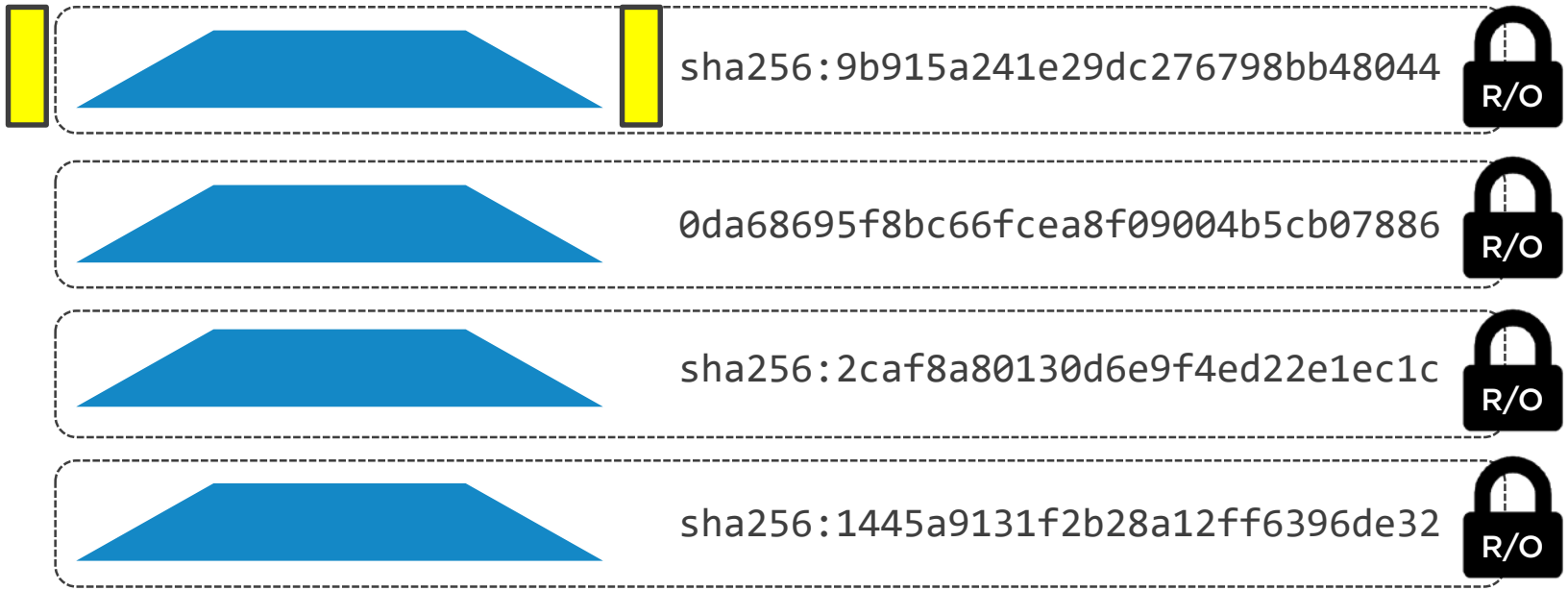


Image Config

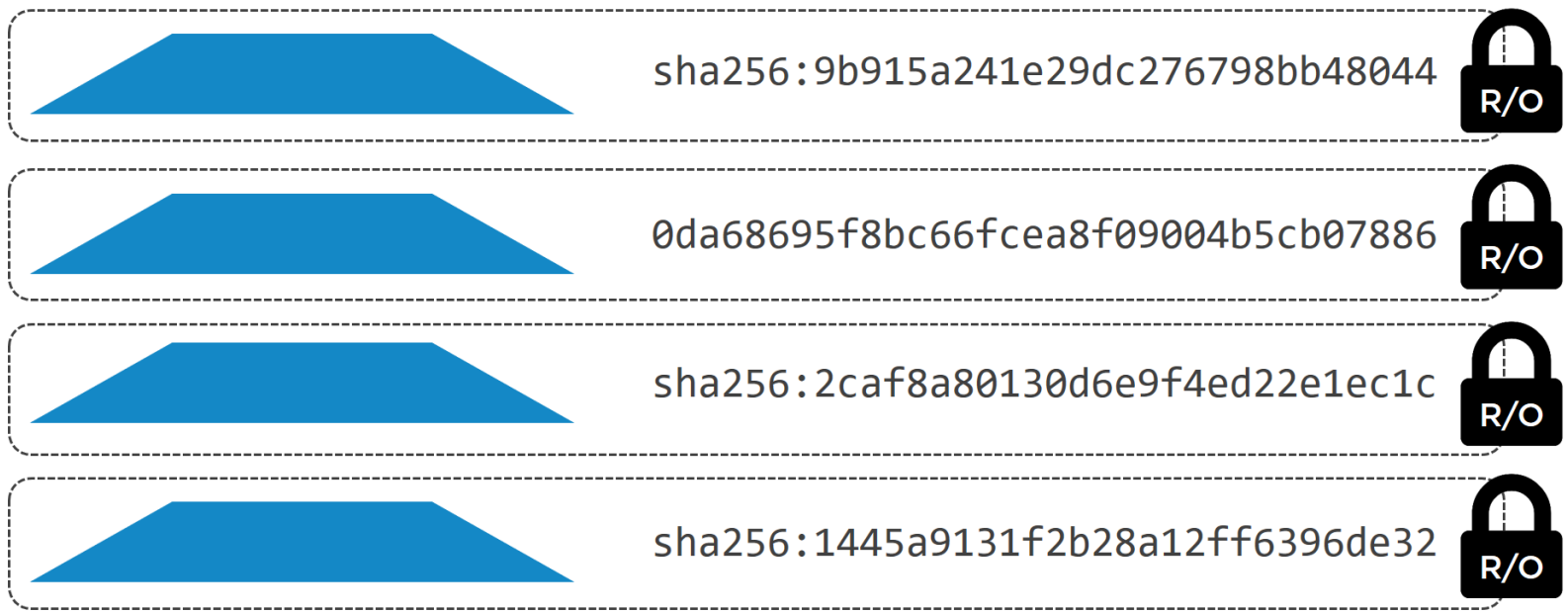

```
{
    "schemaVersion": 2,
    "mediaType": "application/vnd.docker.distribution.manifest.v2+json",
    "config": {
        "mediaType": "application/vnd.docker.container.image.v1+json",
        "size": 7023,
        "digest": "sha256:b5b2b2c507a0944348e0303114d8d93aaaa081732b86451d9bce1f432a537bc7"
    },
    "layers": [
        {
            "mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
            "size": 32654,
            "digest": "sha256:e692418e4cbaf90ca69d05a66403747baa33ee08806650b51fab815ad7fc3
        },
        {
            "mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
            "size": 16724,
            "digest": "sha256:3c3a4604a545cdc127456d94e421cd355bca5b528f4a9c1905b15da2eb4a4
        },
        {
            "mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
            "size": 73109,
            "digest": "sha256:ec4b8955958665577945c89419d1af06b5f7636b4ac3da7f12184802ad867
        }
        {
            "mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
            "size": 73109,
            "digest": "sha256:ec4b8955958665577945c89419d1af06b5f7636b4ac3da7f12184802ad867
        }
    ]
}
```

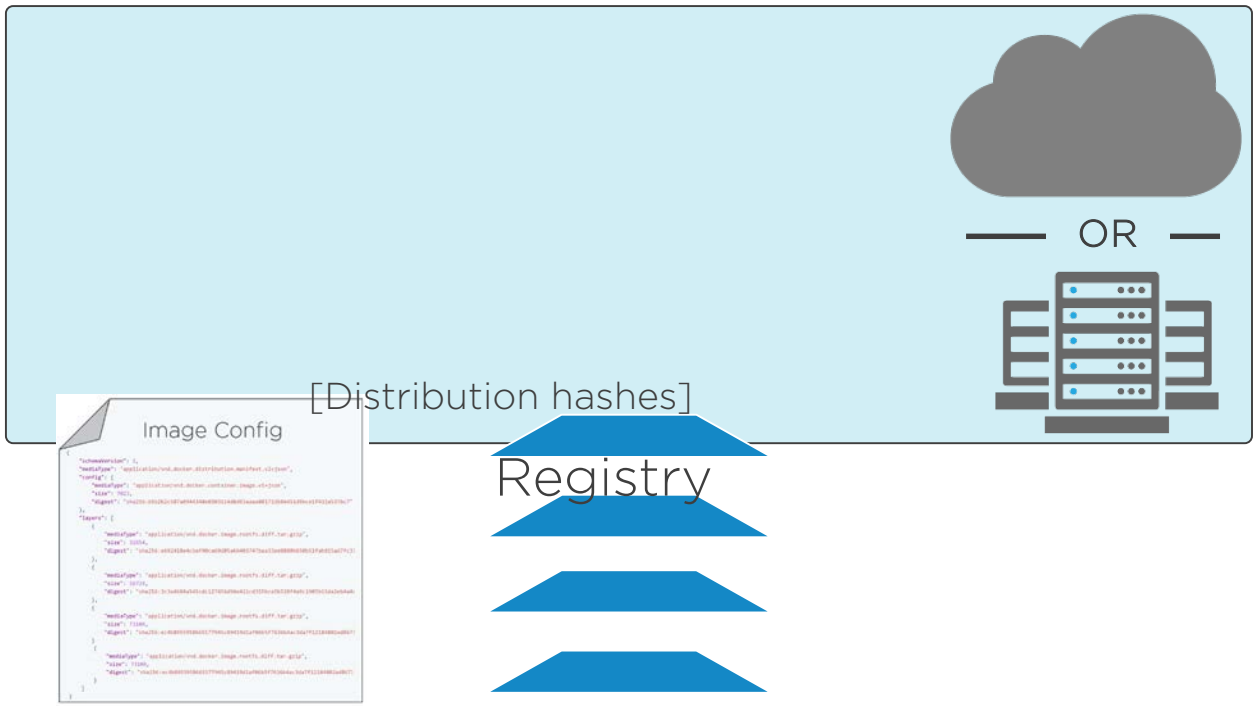

sha256:d124781fc06a73b05

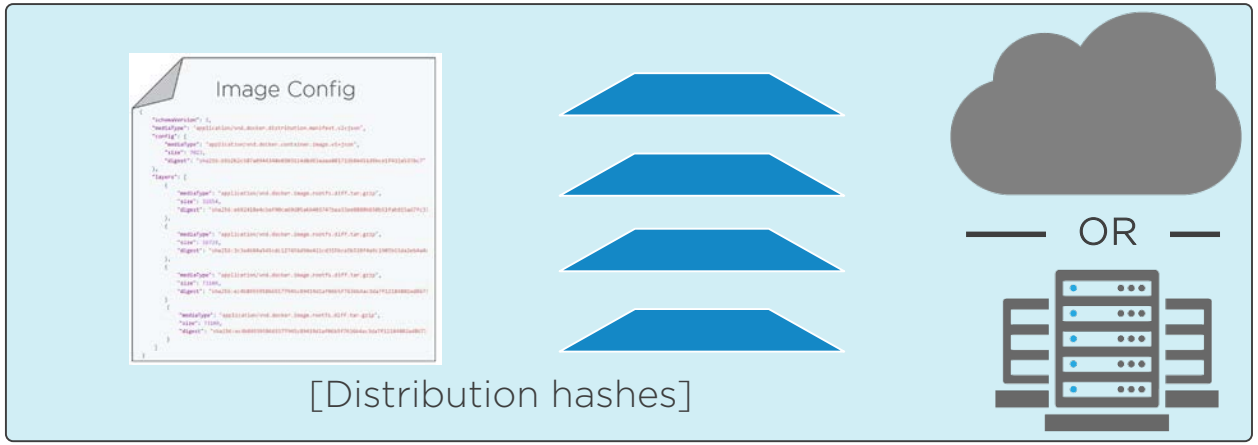
Image Config


```
{
    "schemaVersion": 2,
    "mediaType": "application/vnd.docker.distribution.manifest.v2+json",
    "config": {
        "mediaType": "application/vnd.docker.container.image.v1+json",
        "size": 7023,
        "digest": "sha256:b5b2b2c507a0944348e0303114d8d93aaaa081732b86451d9bce1f432a537bc7"
    },
    "layers": [
        {
            "mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
            "size": 32654,
            "digest": "sha256:e692418e4cbaf90ca69d05a66403747baa33ee08806650b51fab815ad7fc3
        },
        {
            "mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
            "size": 16724,
            "digest": "sha256:3c3a4604a545cdc127456d94e421cd355bca5b528f4a9c1905b15da2eb4a4
        },
        {
            "mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
            "size": 73109,
            "digest": "sha256:ec4b8955958665577945c89419d1af06b5f7636b4ac3da7f12184802ad8677
        }
        {
            "mediaType": "application/vnd.docker.image.rootfs.diff.tar.gzip",
            "size": 73109,
            "digest": "sha256:ec4b8955958665577945c89419d1af06b5f7636b4ac3da7f12184802ad8677
        }
    ]
}
```

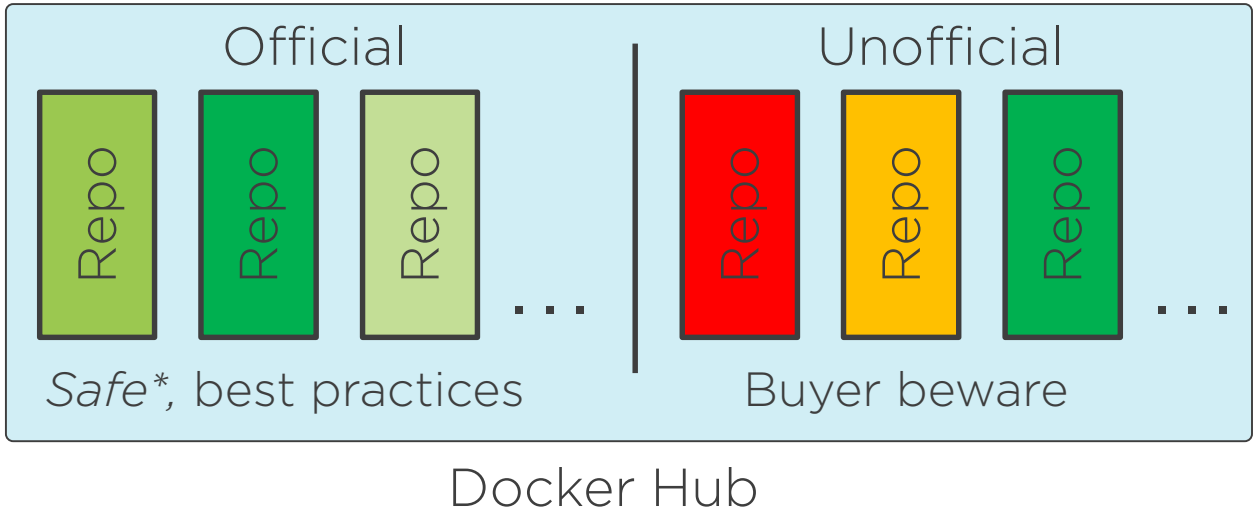

sha256:d124781fc06a73b05




OR
[Distribution hashes]
Image Config
Registry



Docker Hub




```
$ docker image push
```

```
$ docker image pull
```

```
$ docker image inspect
```

```
$ docker image rm
```

Coming up

NEXT MODULE

Building New Images