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Discover. Collaborate. Deploy.

The 12-factors and IBM Cloud Foundry

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Agenda

- Introduction
- Lab 1 – hands on with Cloud Foundry on IBM Cloud
- Cloud Foundry Basics
- Lab 2 – hands on with Cloud Foundry CLI
- The 12-factors and IBM Cloud Foundry **<= you are here!**
- Lab 3 – Using toolchains for CD of Cloud Foundry apps

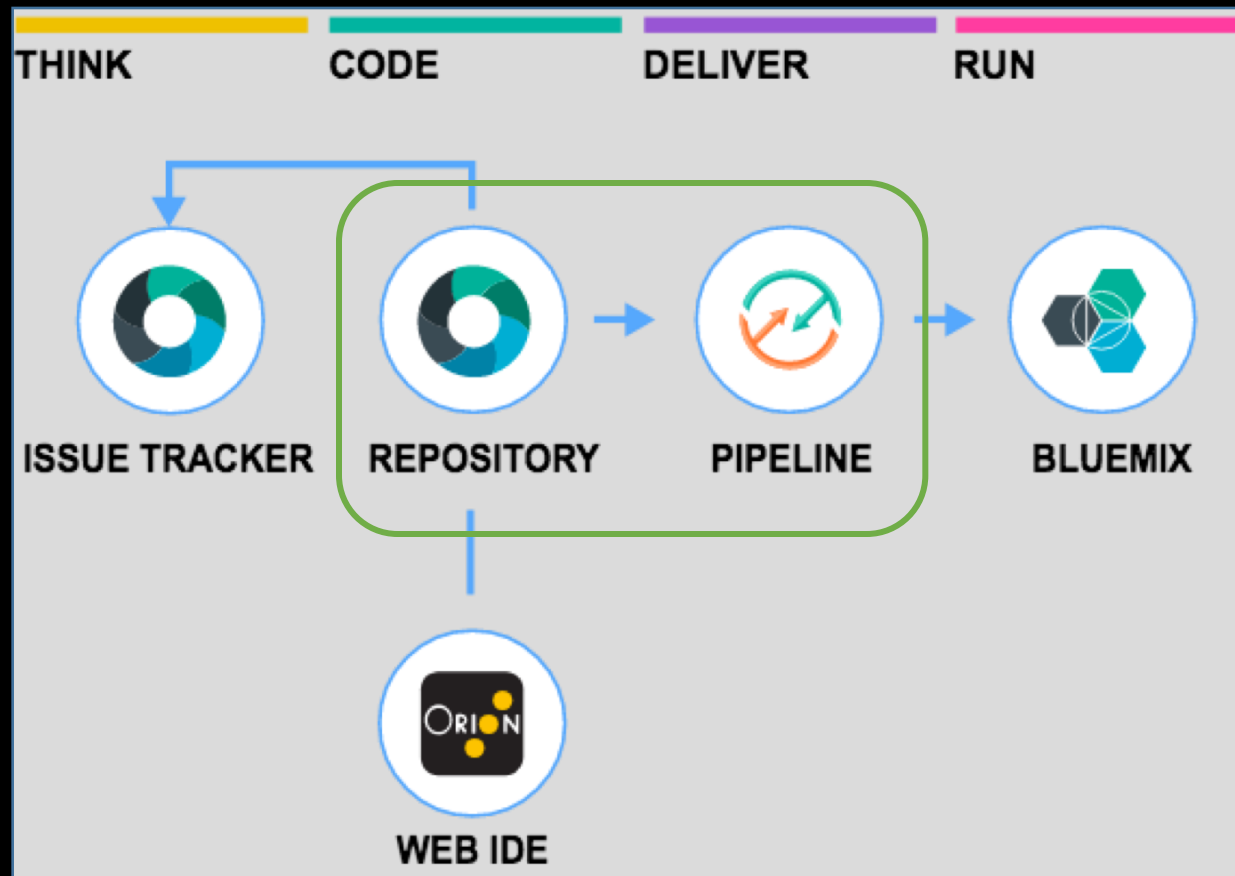
Twelve Factor and IBM Cloud - 1. Codebase

1. Codebase

2. Dependencies
3. Config
4. Backing Services
5. Build, release, run
6. Processes
7. Port binding
8. Concurrency
9. Disposability
10. Dev/prod parity
11. Logs
12. Admin processes

- One codebase tracked in revision control, many deploys
 - **Cloud Foundry: utilize IBM Continuous Delivery toolchains or external automation with Cloud Foundry tooling (Urban Code Deploy, Gradle, Jenkins, ...)**
-

Codebase – IBM Cloud Continuous Delivery toolchains



A *toolchain* is a set of tool integrations that support development, deployment, and operations tasks.

Tool integrations with the source code repository and delivery pipelines can drive multiple deployments from a single repository

Twelve Factor and IBM Cloud - 2. Dependencies

1. Codebase
- 2. Dependencies**
3. Config
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- Explicitly declare and isolate dependencies
 - Typically platform dependent e.g. npm, bundler, or Liberty feature manager
 - Never rely on or assume system-wide dependencies
 - **Cloud Foundry: buildpacks manage external dependencies during staging**
-

Dependencies



```
1 {
2   "name": "MachineTranslationNodejs",
3   "version": "0.0.1",
4   "description": "A sample nodejs app for Bluemix that use the machine translation service",
5   "dependencies": {
6     "express": "3.4.7",
7     "jade": "1.1.4",
8     "cors": "2.4.2"
9   },
10  "engines": {
11    "node": "0.10.26"
12  },
13  "repository": {}
14 }
15
```

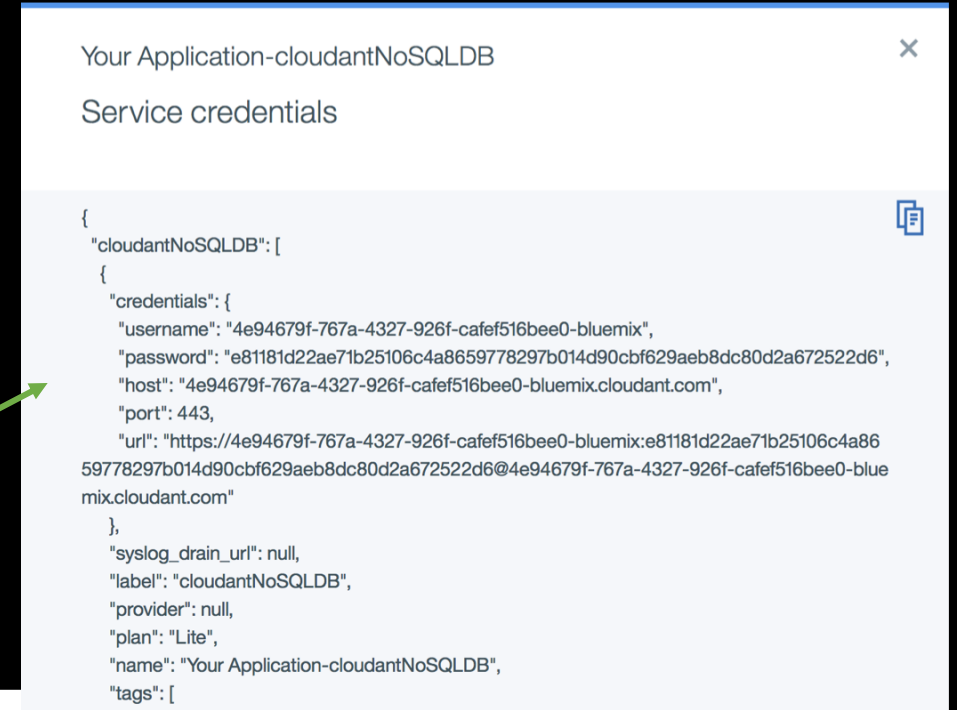
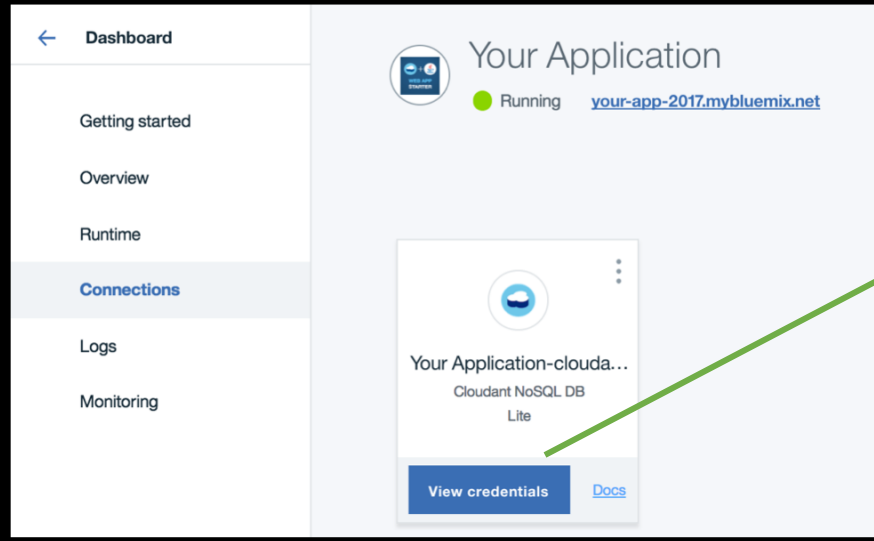
Added cors

Twelve Factor and IBM Cloud - 3. Config

1. Codebase
2. Dependencies
- 3. Config**
4. Backing Services
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- Separate config from source
- Store config in the environment
- Avoid 'config grouping' of properties
- **Cloud Foundry: applications are parameterized via system provided and custom environment variables.**

Config



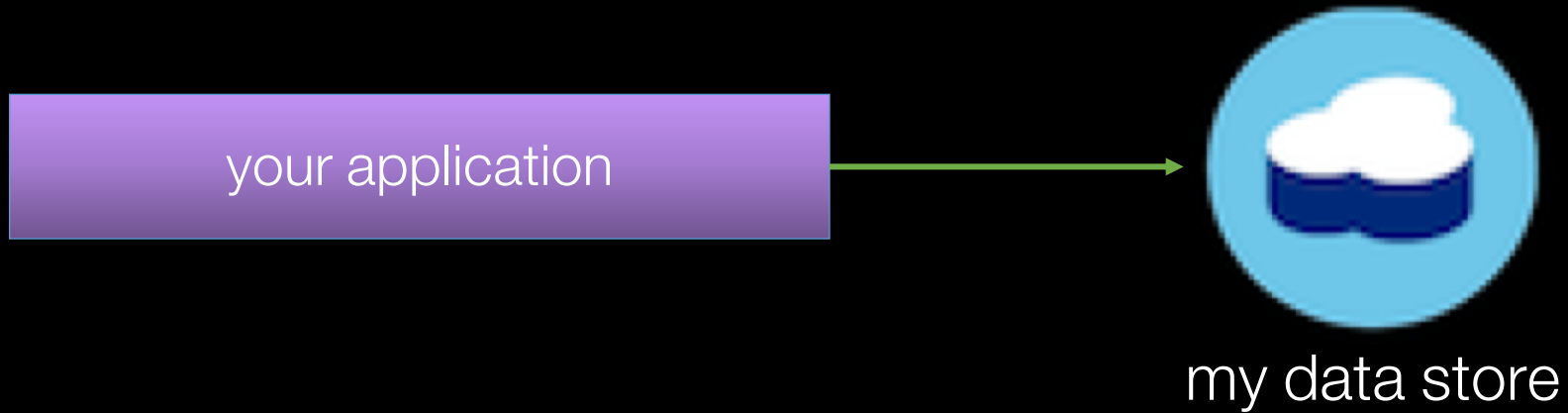
```
37 private static CloudantClient createClient() {
38     String VCAP_SERVICES = System.getenv("VCAP_SERVICES");
39     String serviceName = null;
40
41     if (VCAP_SERVICES != null) {
42         // When running in Bluemix, the VCAP_SERVICES env var will have the credentials for all t
43         // Parse the VCAP JSON structure looking for cloudant.
44         JsonObject obj = (JsonObject) new JsonParser().parse(VCAP_SERVICES);
45         Entry<String, JsonElement> dbEntry = null;
46         Set<Entry<String, JsonElement>> entries = obj.entrySet();
47         // Look for the VCAP key that holds the cloudant no sql db information
48         for (Entry<String, JsonElement> eachEntry : entries) {
49             if (eachEntry.getKey().toLowerCase().contains("cloudant")) {
50                 dbEntry = eachEntry;
51                 break;
52             }
53         }
54         if (dbEntry == null) {
55             throw new RuntimeException("Could not find cloudantNoSQLDB key in VCAP_SERVICES env \
56     }
```


Twelve Factor and IBM Cloud - 4. Backing Services

1. Codebase
2. Dependencies
3. Config
- 4. Backing Services**
5. Build, release, run
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- Treat backing services as attached resources
- Local and remote resources should be treated identically
- **Cloud Foundry: same mechanism for creating and binding to all services (including custom/external through user-provided services)**

Backing Services



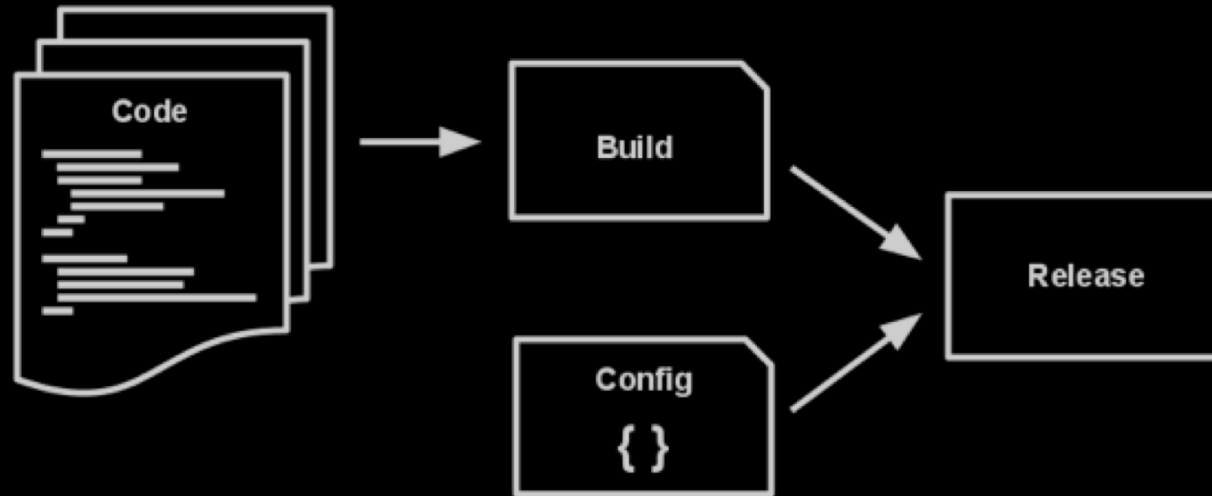
```
cf push "your application"--no-start  
cf create-service cloudbantNoSQLDB Lite "my data store"  
cf bind-service "your application" "my data store"  
cf start "your application"
```

Twelve Factor and IBM Cloud - 5. Build, release, run

1. Codebase
2. Dependencies
3. Config
4. Backing Services
- 5. Build, release, run**
6. Processes
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- Strictly separate build and run stages
 - **Output from Cloud Foundry application build and staging is immutable container object. In IBM Cloud Container Service, the Docker build creates a container image that is stored to the private image registry.**
-

Build, Release, Run



Code + CF Buildpack => immutable Garden container image

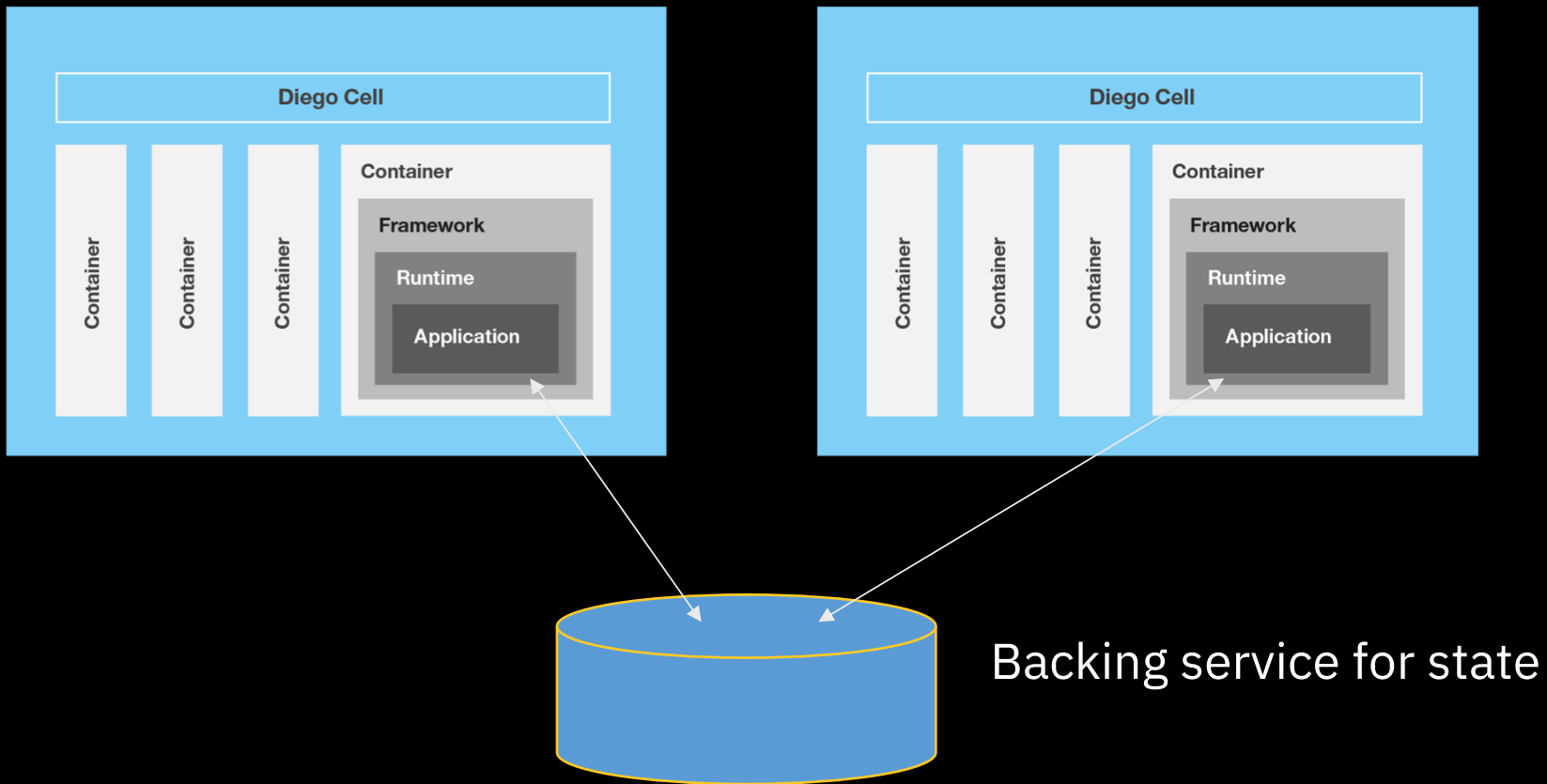
Twelve Factor and IBM Cloud - 6. Processes

1. Codebase
2. Dependencies
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- Execute the app as one or more stateless processes
 - Never rely on sticky sessions
 - **IBM Cloud: design application instances to be stateless (state is held by services)**
-

Processes

Stateless : use external service to retain state



Twelve Factor and IBM Cloud - 7. Port Binding

1. Codebase
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8. Concurrency
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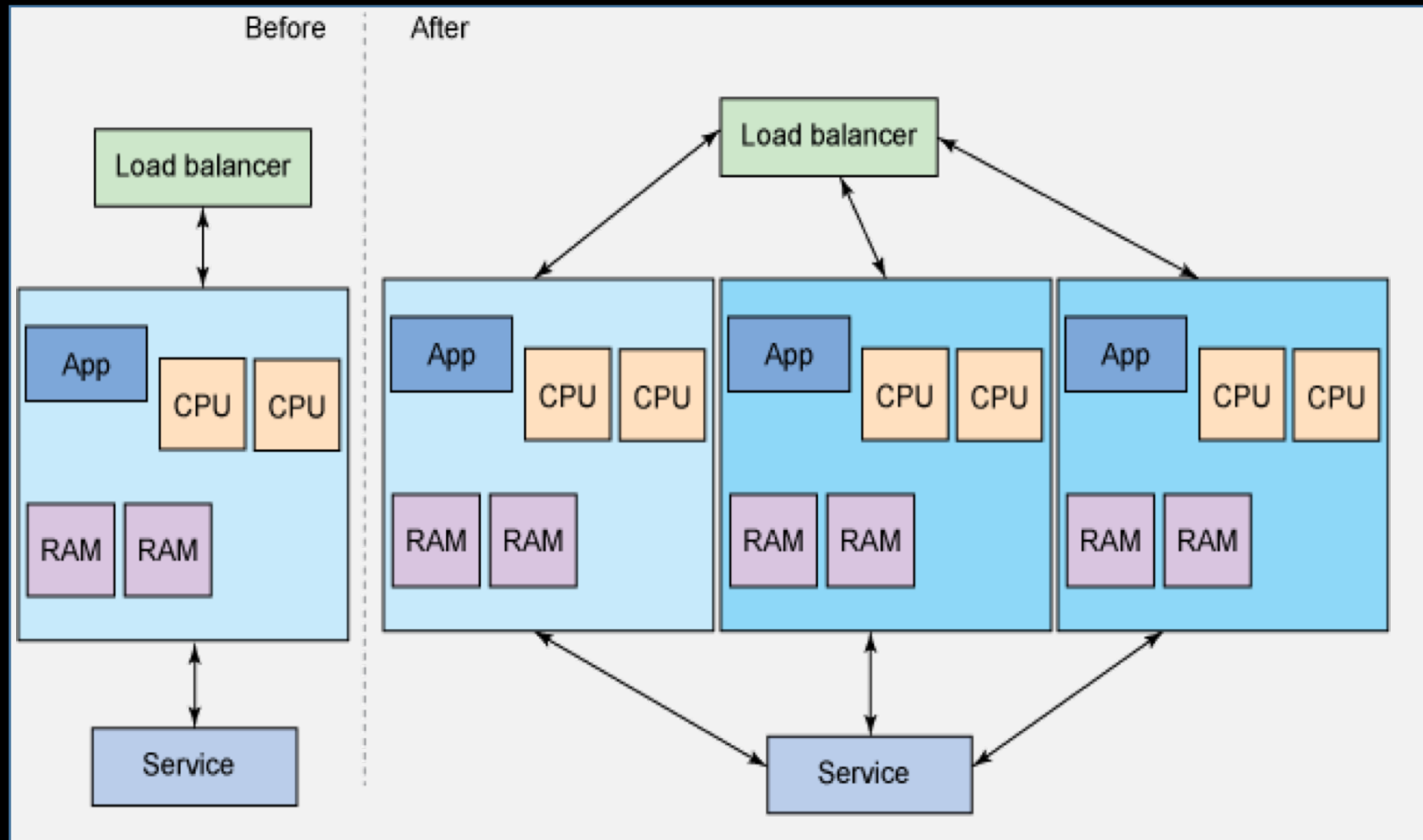
- Export services via port binding
 - **Cloud Foundry applications create a service port implementing HTTP or web sockets protocol. The IBM Cloud infrastructure handles routing of requests to the port.**
-

Twelve Factor and IBM Cloud - 8. Concurrency

1. Codebase
2. Dependencies
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- 8. Concurrency**
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- Scale out via the process model
 - Servers, VMs can only scale vertically so far
 - Stateless service model makes scaling simple
 - **For Cloud Foundry applications, use CLI or web UI to manually scale and auto-scaling service to scale based on app metrics.**
-

Concurrency



Twelve Factor and IBM Cloud – 9. Disposability

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- 9. Disposability**
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- Maximize robustness with fast startup and graceful (and quick) shutdown
 - Application instances are disposable
 - Robust against death of underlying resources
 - **IBM Cloud Foundry runtimes quickly start and terminate, but the application must adhere as well**
-

Twelve Factor and IBM Cloud – 10. Dev/prod parity

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- Keep development, staging, and production as identical as possible
 - Use the same backing service types and versions in every environment
 - **Cloud Foundry spaces can be used to separate environments all running in the same organization and hosting platform**
-

Twelve Factor and IBM Cloud – 11. Logs

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- 11. Logs**
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- Treat logs as event streams
- Don't write to log files
- **The Cloud Foundry loggregator provides event streams for applications; can be drained to third-party log management system.**

Twelve Factor and IBM Cloud – 12. Admin processes

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- 12. Admin processes**

- Run admin/management tasks as one-off processes
 - E.g. database migrations or for debugging
 - **Use separate single-shot admin processes bound to the same services as application**
-

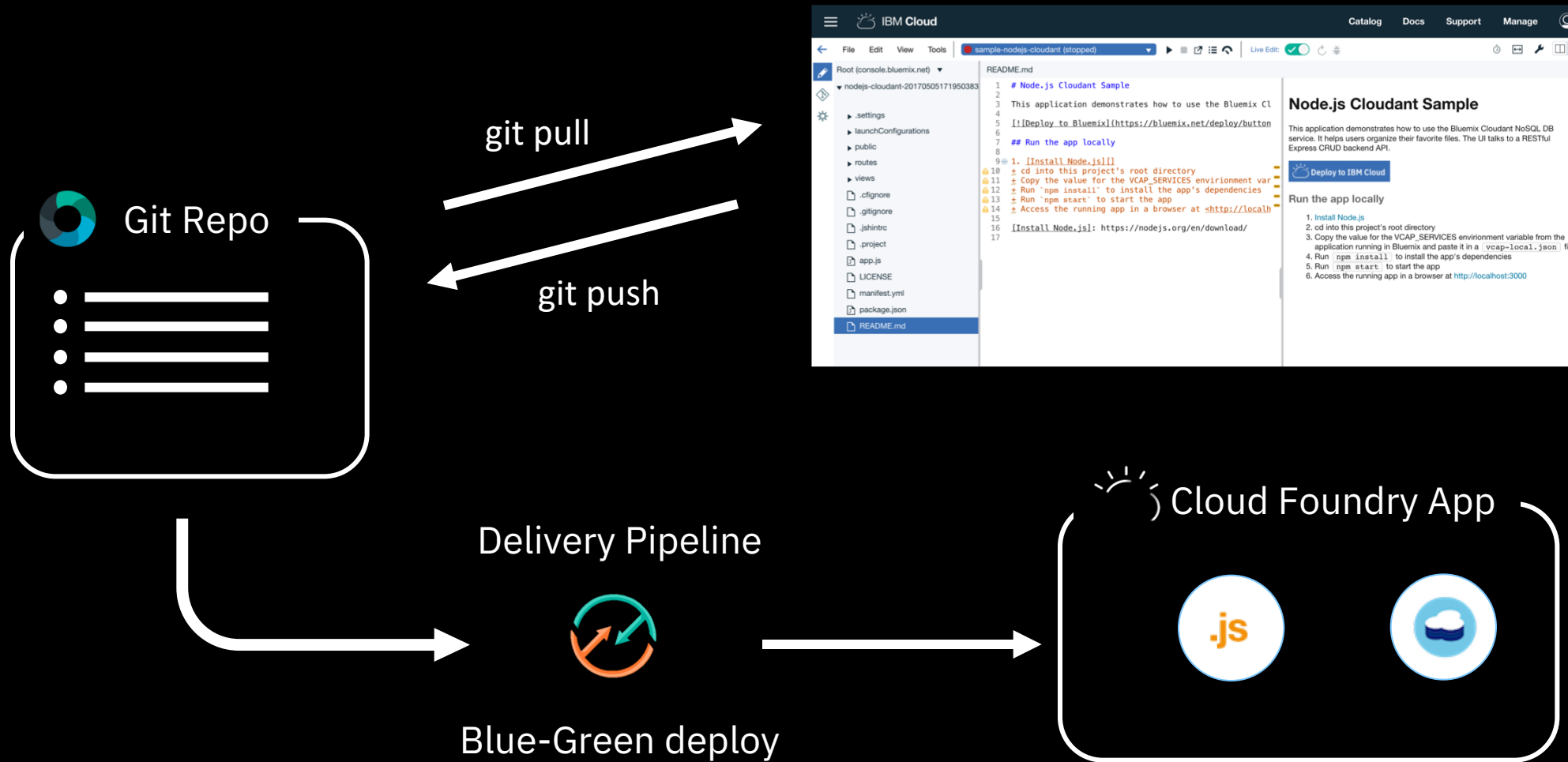
IBM Cloud DevOps



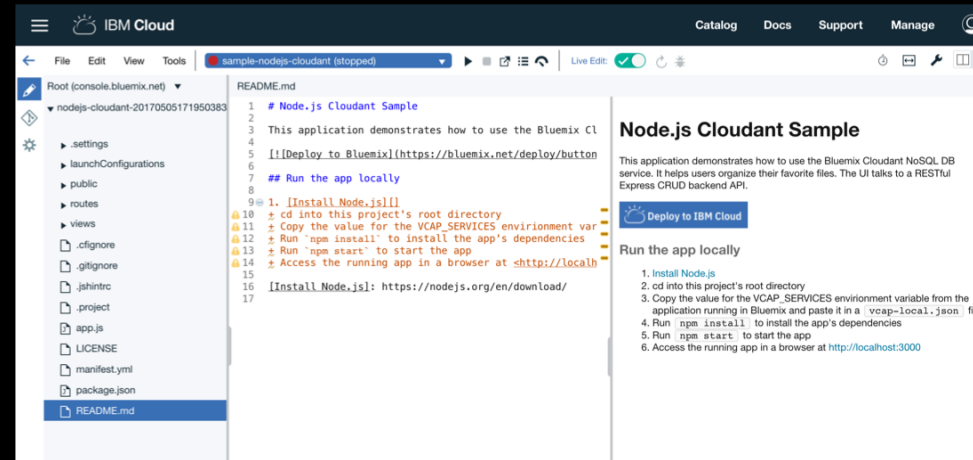
- Linked and integrated tool sets
 - Issue Management
 - Code Repository
 - Code Editing
 - Testing
 - Insights/Analytics
 - Collaboration
 - Alerting
 - Deployment

The screenshot shows the IBM Cloud DevOps console interface. At the top, there's a navigation bar with 'IBM Cloud' and links for 'Catalog', 'Docs', 'Support', and 'Manage'. Below this, the page title is 'Toolchains / nodejs-cloudant-20170505171950383'. A 'View app' button is on the right. The main content area is divided into three columns: 'THINK', 'CODE', and 'DELIVER'. Under 'THINK', there's a card for 'Issues' (nodejs-cloudant-2017...). Under 'CODE', there's a card for 'Git' (nodejs-cloudant-2017...). Under 'DELIVER', there's a card for 'Delivery Pipeline' (nodejs-cloudant-2017...). Below these, there's a card for 'Eclipse Orion Web IDE'. Each card has a 'Configured' status indicator. An 'Add a Tool' button is located on the right side of the main area.

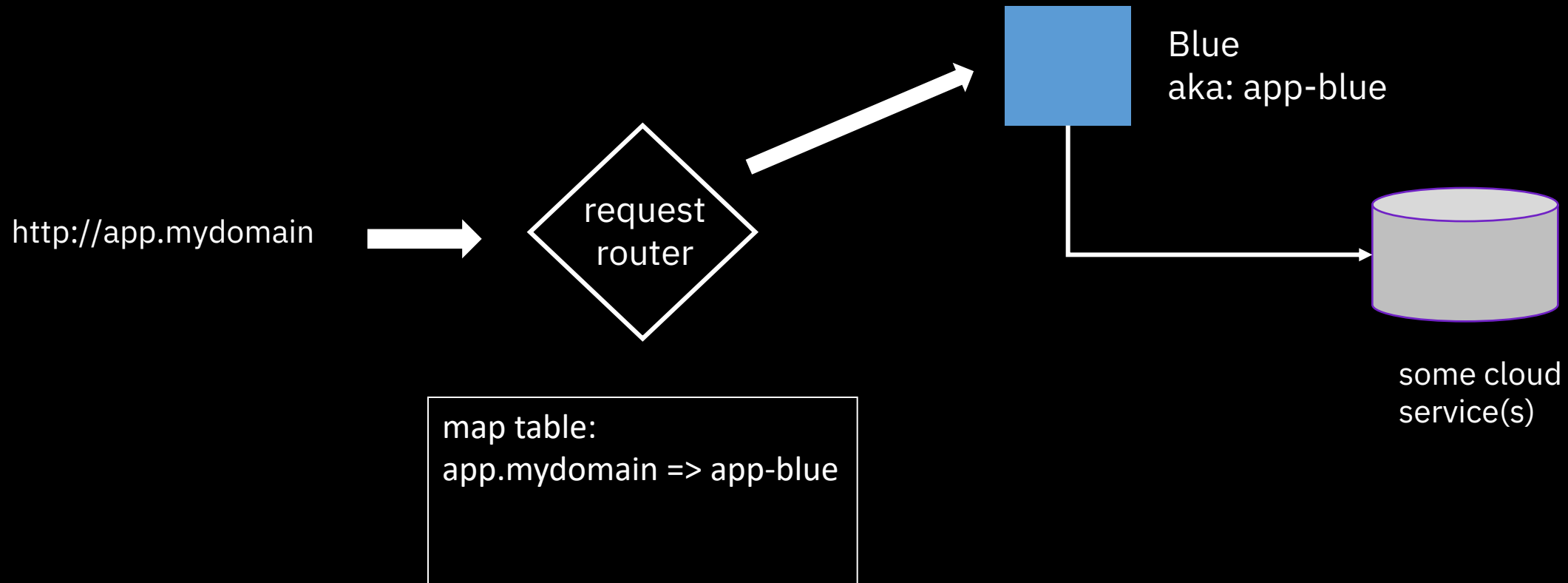
Lab 3 - DevOps Flow



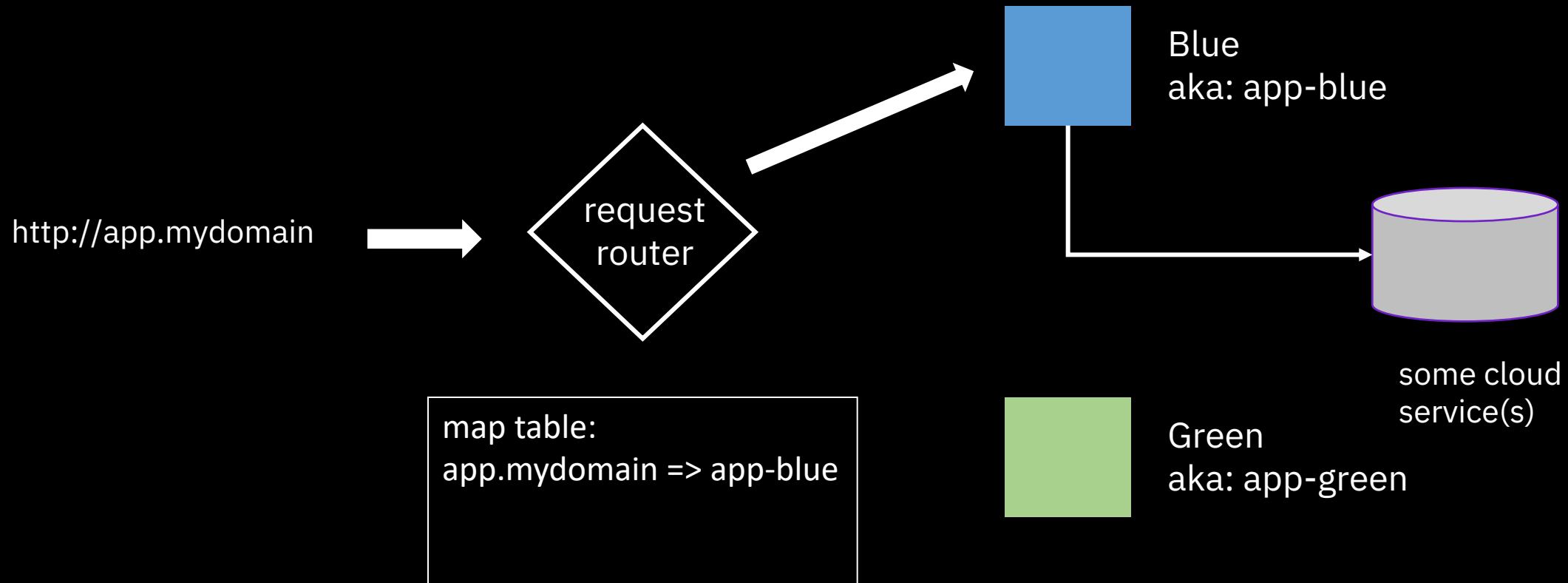
Eclipse Orion
web IDE



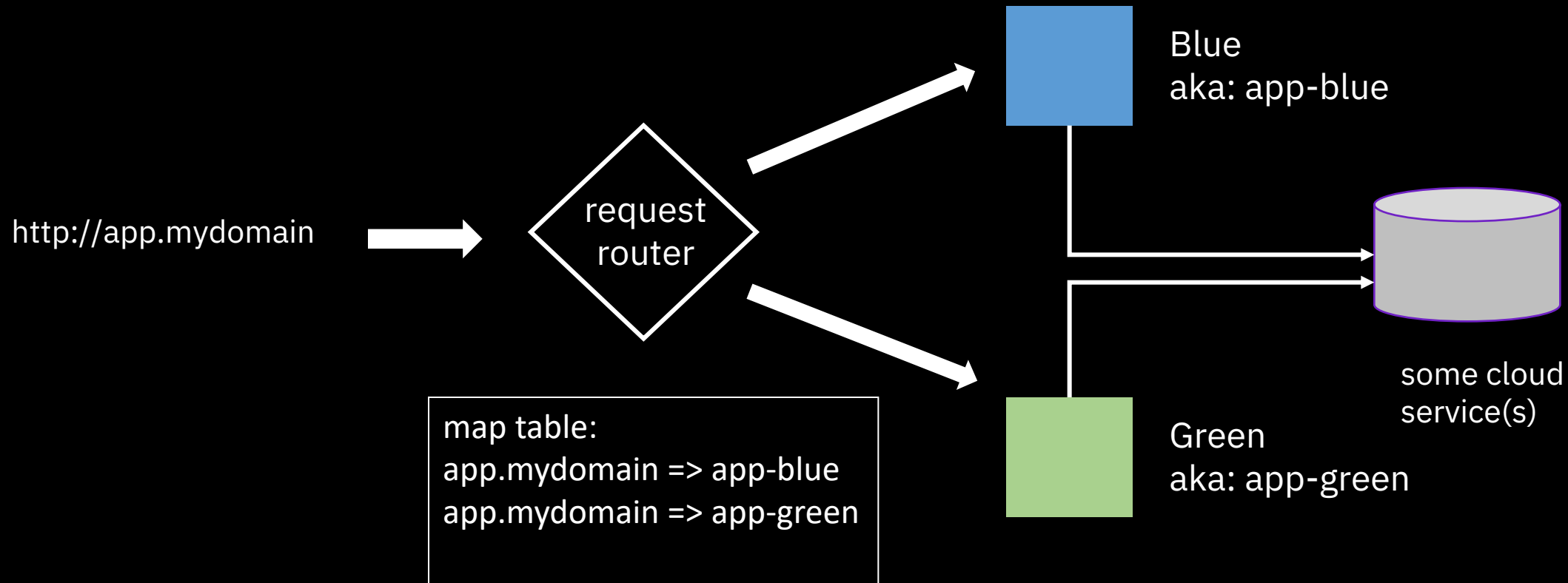
Blue-Green Deployment – initial state



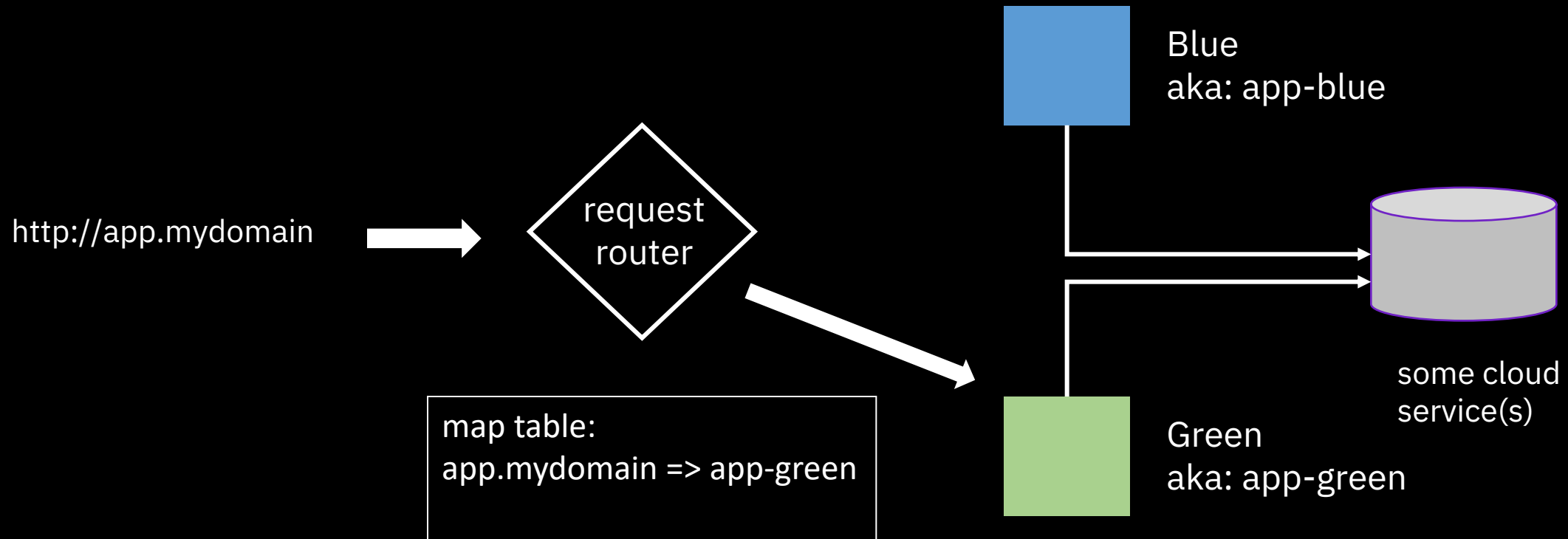
Blue-Green Deployment – add green



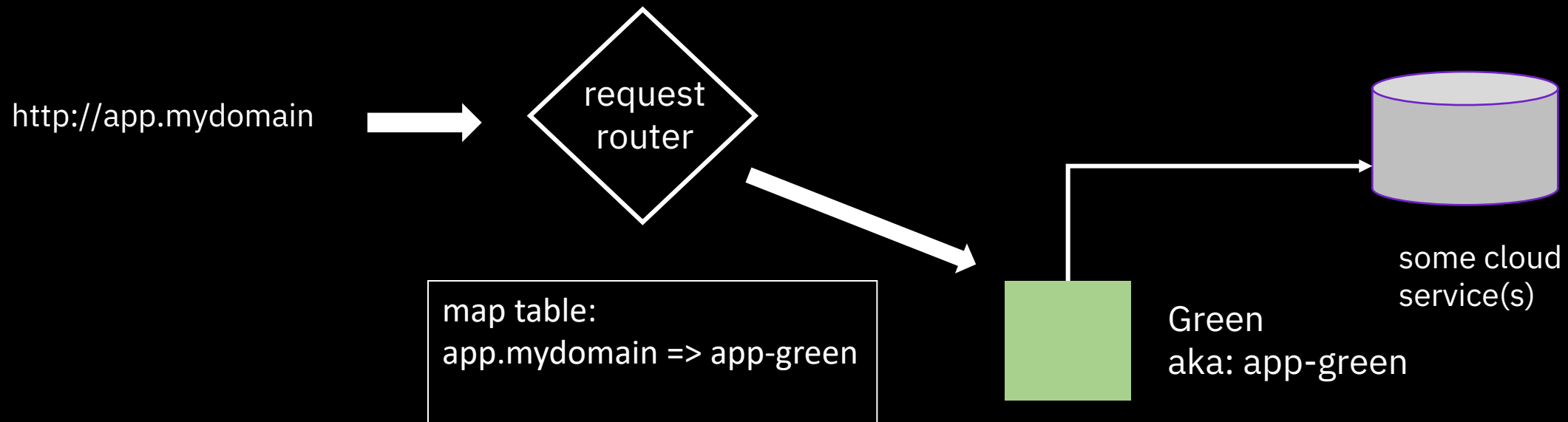
Blue-Green Deployment – map green



Blue-Green Deployment – unmap blue



Blue-Green Deployment – remove blue



Lab 3 – Automate with Continuous Delivery toolchains

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