Spring Cloud Data Flow Architecture

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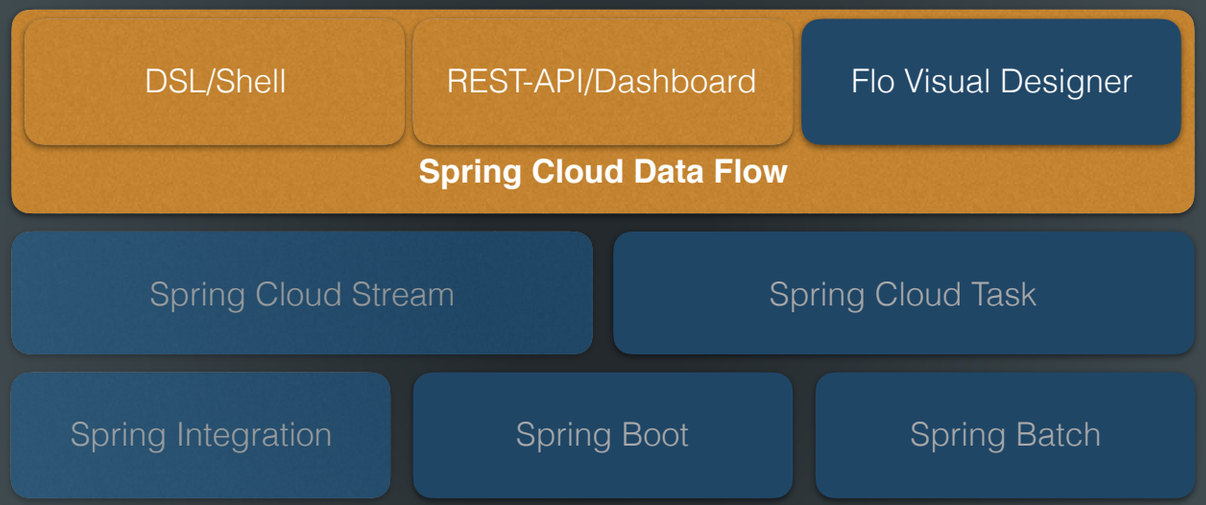
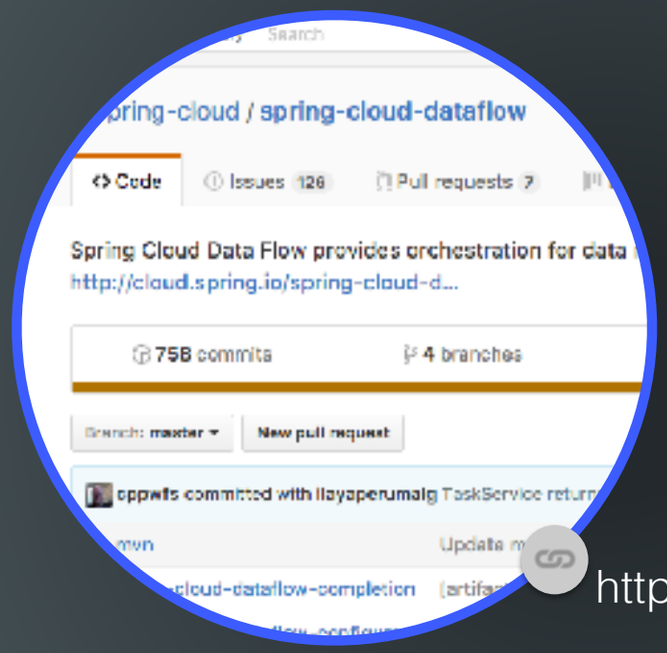
In this section we will cover
The major components of Spring Cloud Data Flow
Go into some detail of each and a quick overview of what they do.
Registering apps


DSL/Shell
REST-API/Dashboard
Flo Visual Designer
Spring Cloud Data Flow
Spring Cloud Stream
Spring Cloud Task
Spring Integration
Spring Boot
Spring Batch

CODE IS ON GITHUB



https://github.com/spring-cloud/spring-cloud-dataflow

JAR LINK

http://repo.spring.io/release/org/springframework/cloud/spring-cloud-dataflow-server-local/1.1.2.RELEASE/spring-cloud-dataflow-server-local-1.1.2.RELEASE.jar

https://flic.kr/p/9Bkxjo

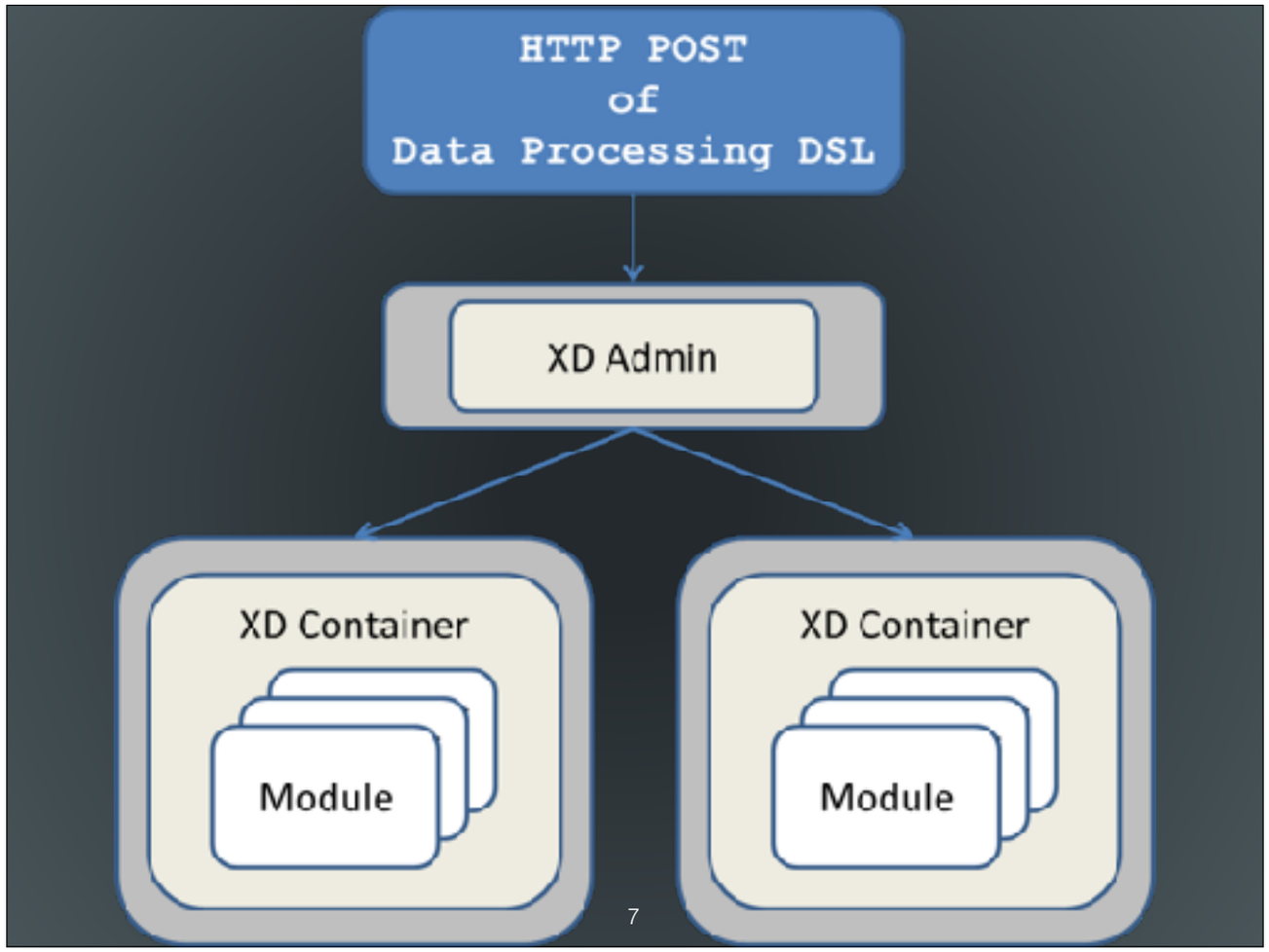
Reference Docs

http://docs.spring.io/spring-cloud-dataflow/docs/1.1.2.RELEASE/reference/htmlsingle/

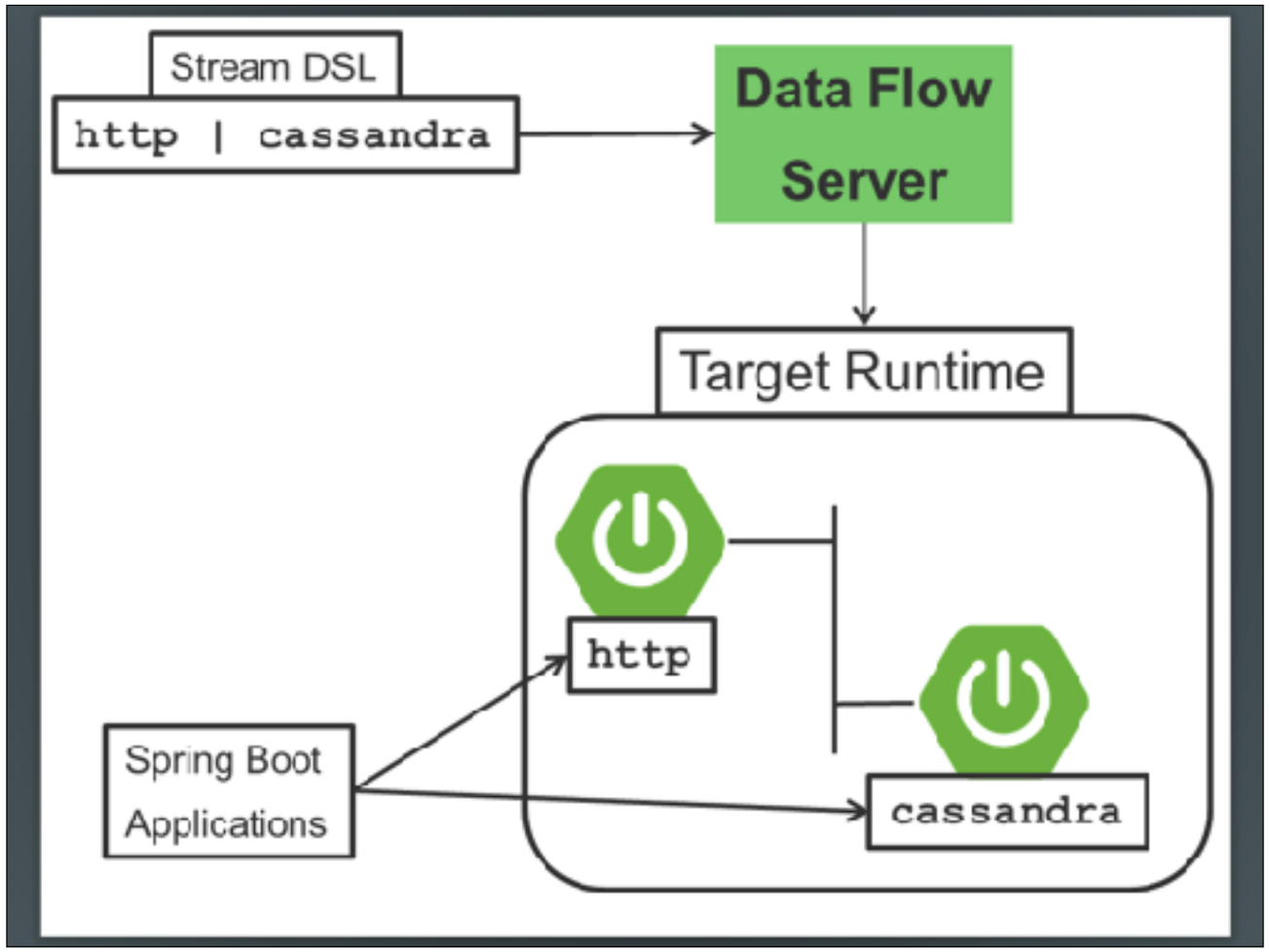
https://flic.kr/p/8MVYfc

Comparing
Spring XD, Spring Cloud Data Flow…

- https://flic.kr/p/9LdVCR

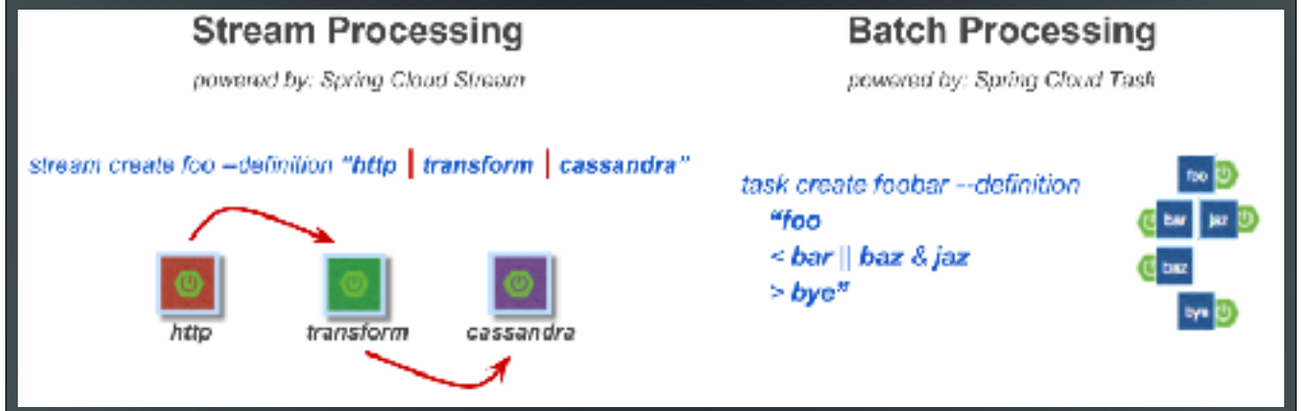


- Spring XD, use a dedicated application execution cluster, unique to each product, that determines where your code should execute on the cluster and perform health checks to ensure that long lived applications are restarted if they fail



- In this case instead of having to manage containers where our apps will be deployed, we deploy spring boot apps to your preferred platform (Cloud Foundry, Yarn, Mesos).

Spring Cloud Data Flow is
a orchestration service for composable microservice applications on modern runtimes



- foo && < bar &&baz ||jaz> && bye
- So as we've discussed SCDF orchestrates the creation of composable microservice applications
- Streams and tasks are composed of applications that are deployed on the platform
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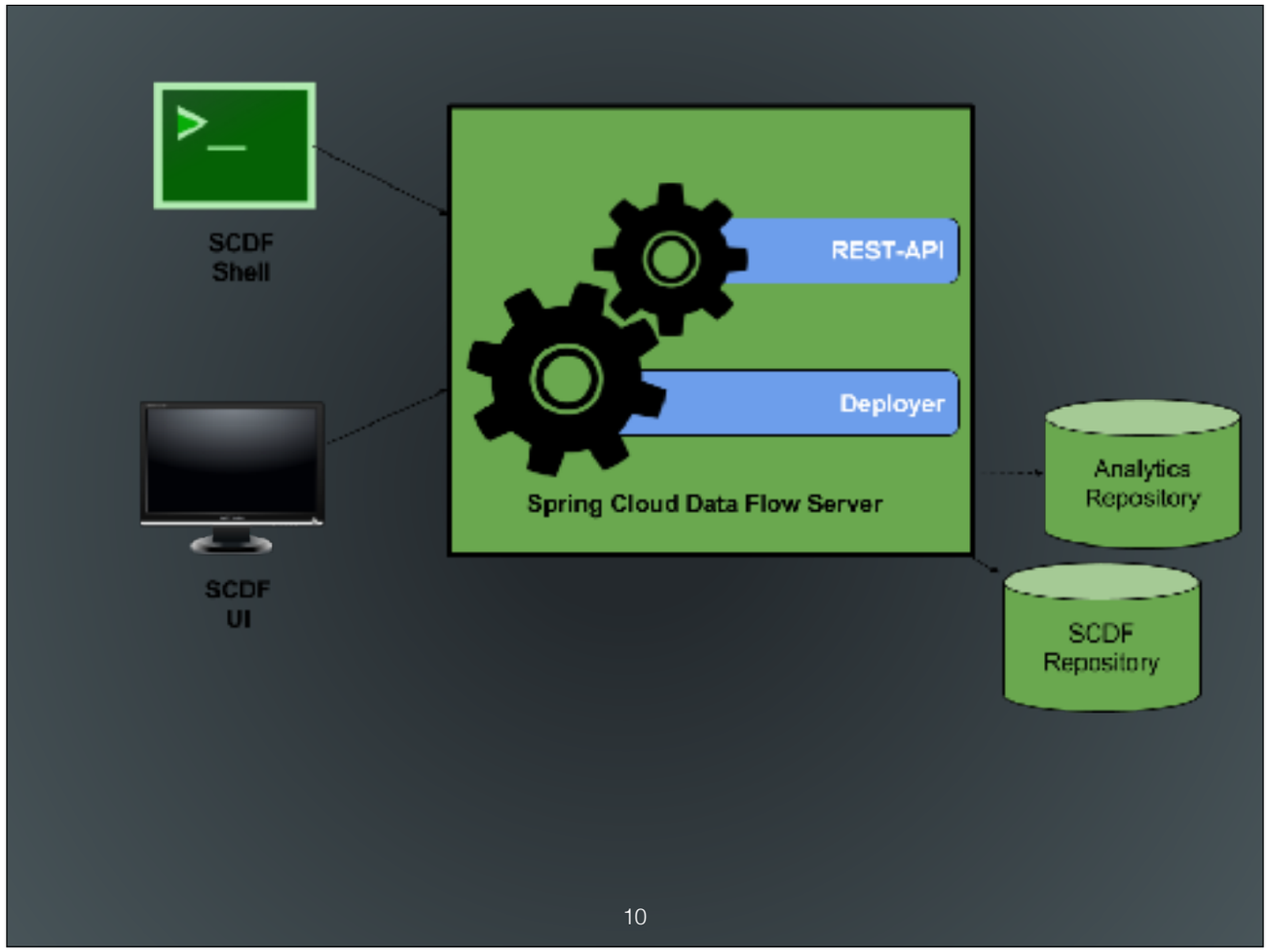
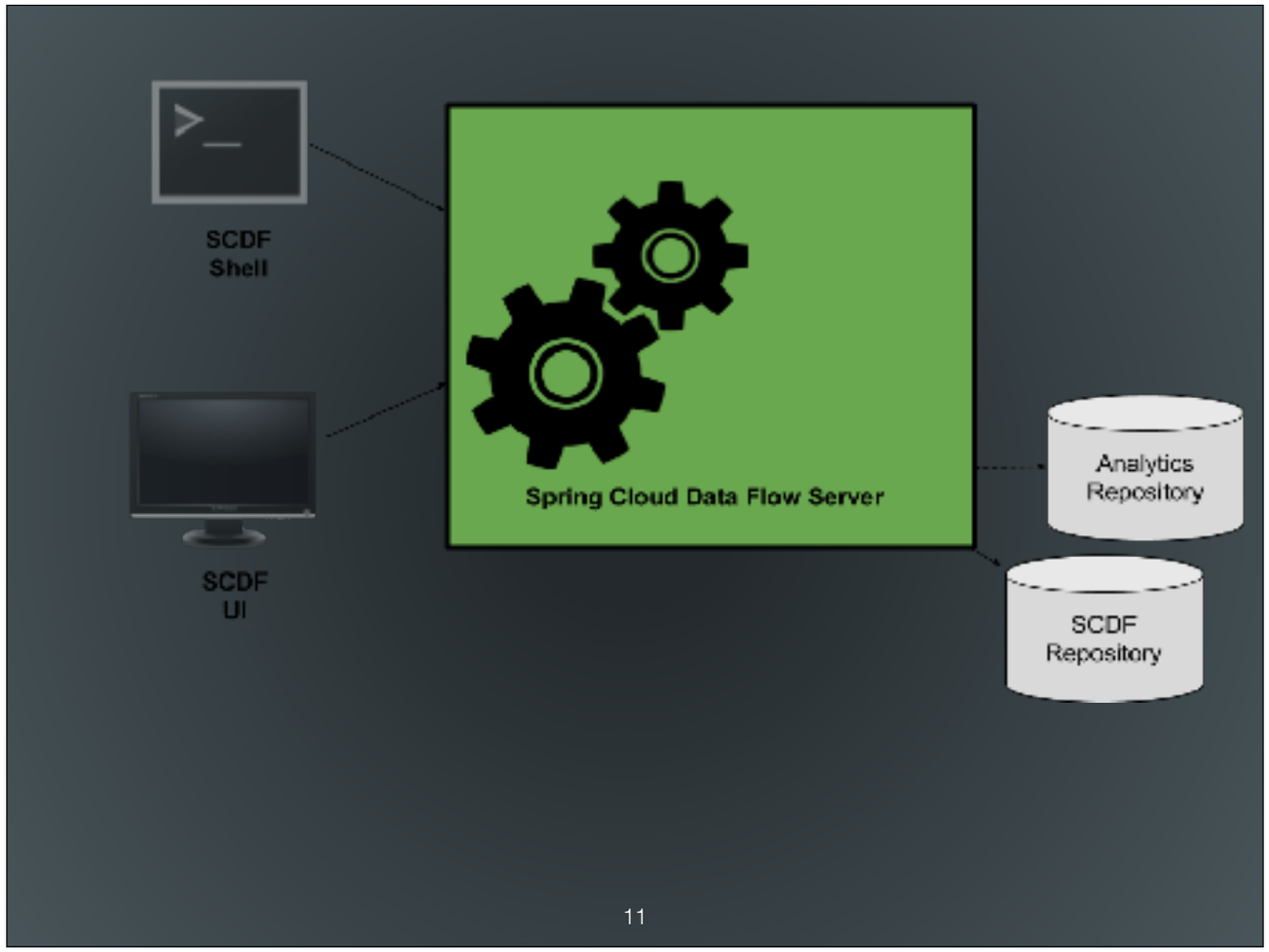


Spring BOOT App

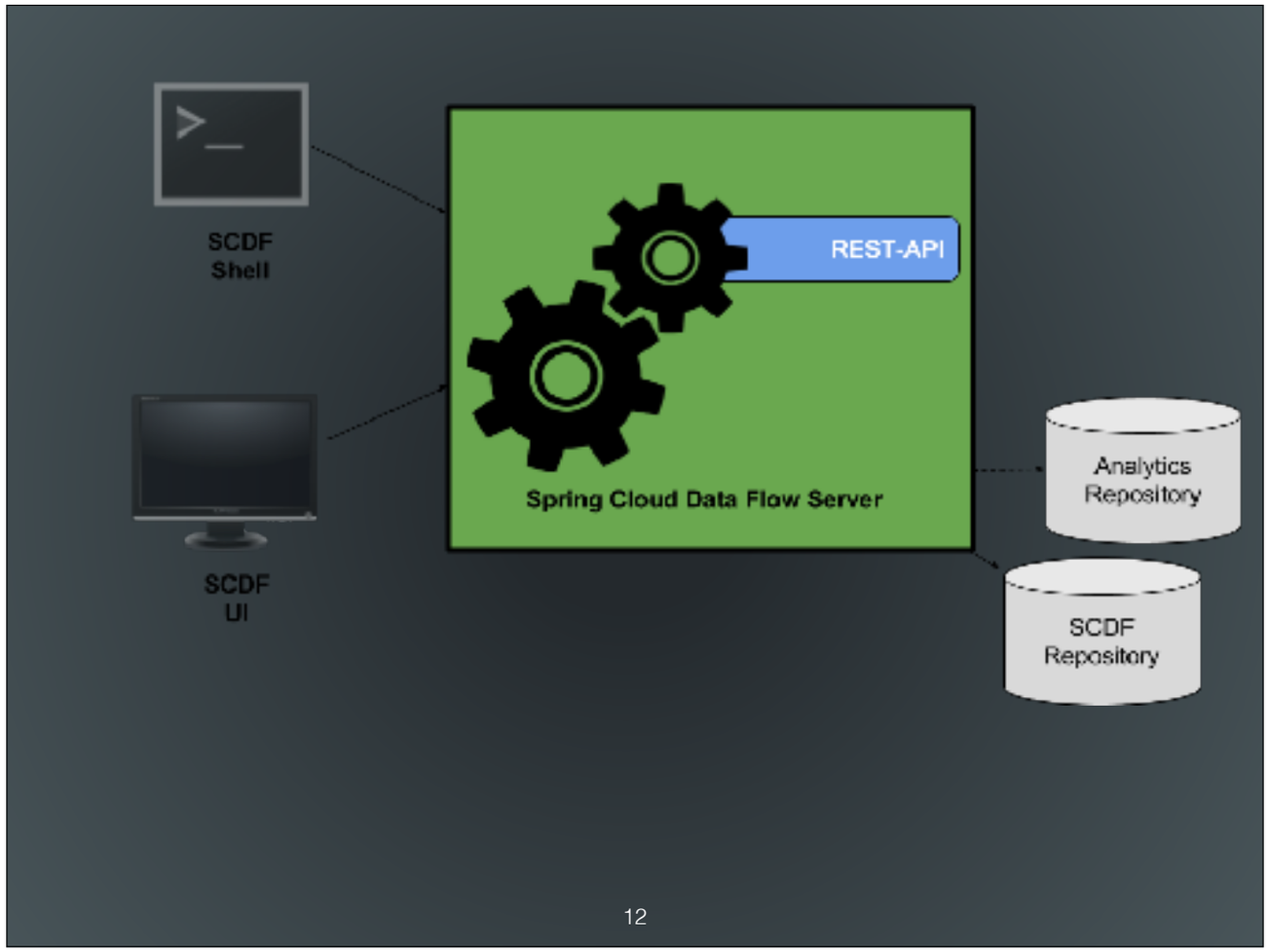
**** ADD BOOT LOGO****

7 Components of the Spring Cloud Data Flow Server

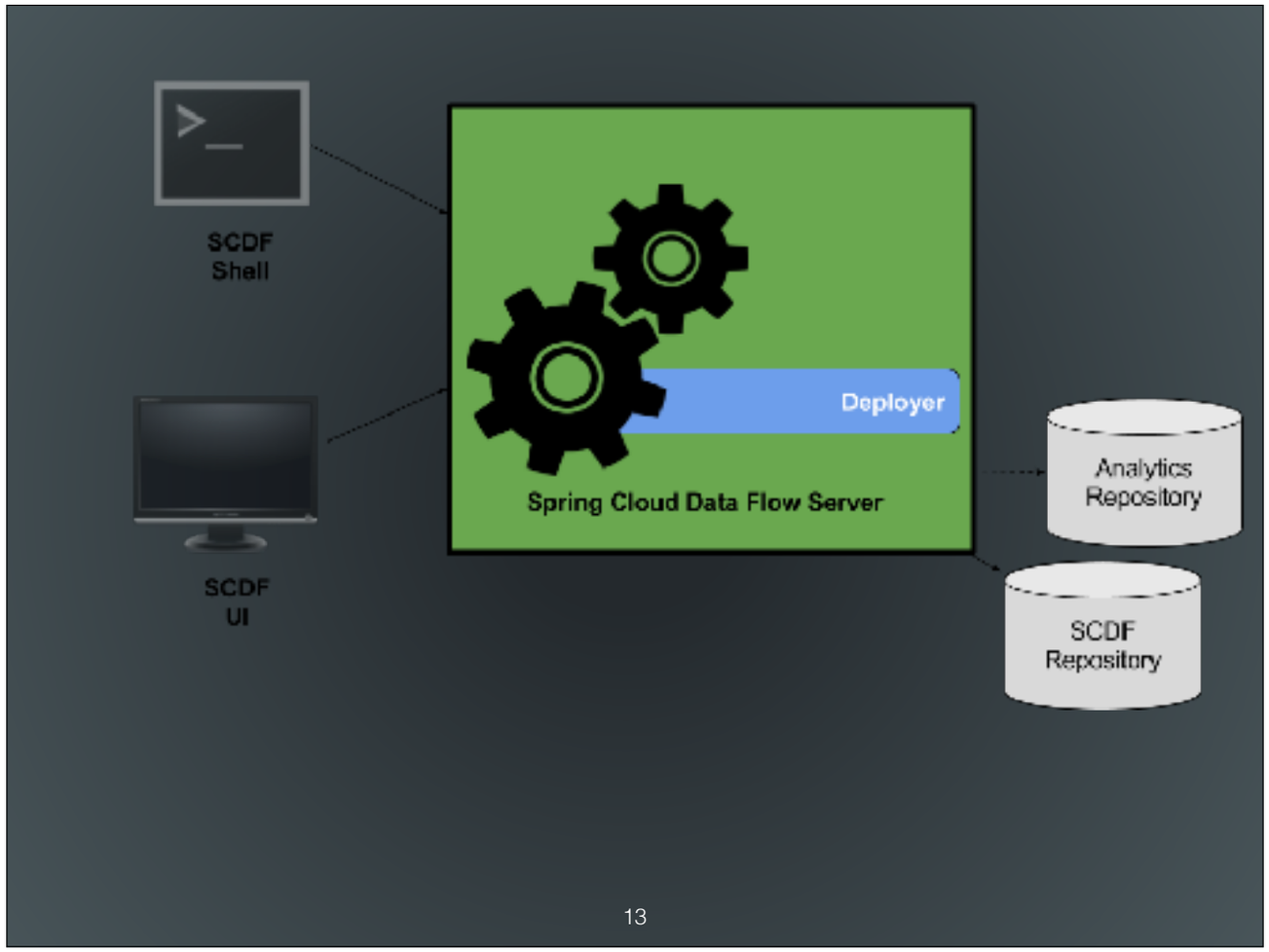
- Server -
- REST-API
- Deployer
- SCDF-UI
- SCDF Shell
- SCDF Repository
- Analytics Repository



- What is the Data Flow Server
  - The Data Flow Server uses an embedded servlet container and exposes REST endpoints for creating, deploying, undeploying, and destroying streams and tasks, querying runtime state, analytics, and the like.
- Allows us to deploy the applications that compose a stream. Or an launch application(s) for a task
- Via a restful-API or UI allows users to retrieve the state of the apps of a stream or task.
- Offers the ability to view the current values of the analytics
- Stores the the URI's of where to obtain the application.
- Stores the definitions for all the tasks and streams

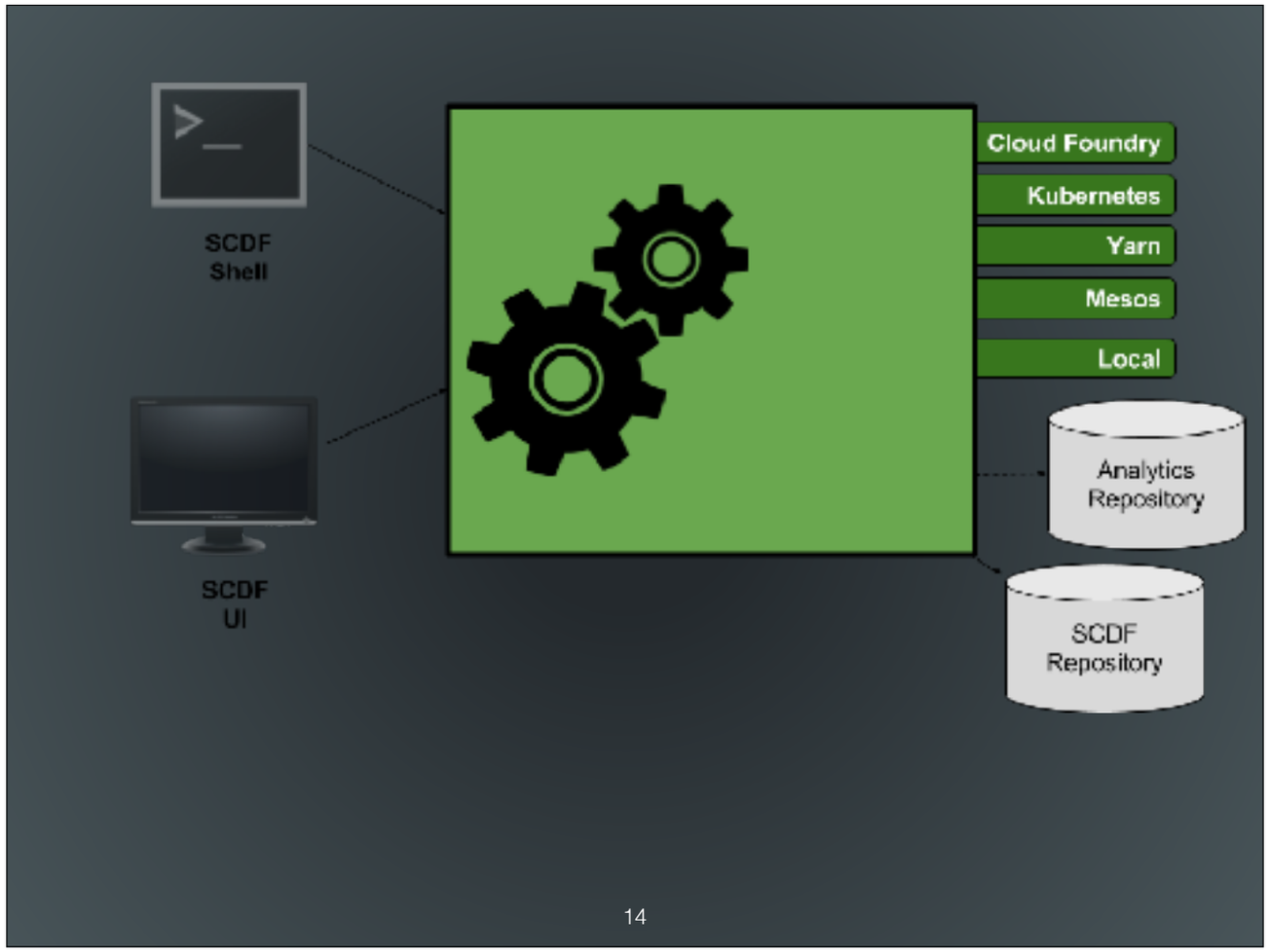


- Restful interface is offered from the SPI and thus all implementations support it.
- This is good for CI implementations
- Is build on Spring HATEOAS so it supports HATEOAS principles
  - Client doesn’t have to have prior knowledge of the server
- The endpoints are broken down into the following categories:
  - Streams
  - Runtime
  - Tasks
  - Jobs
  - Metrics



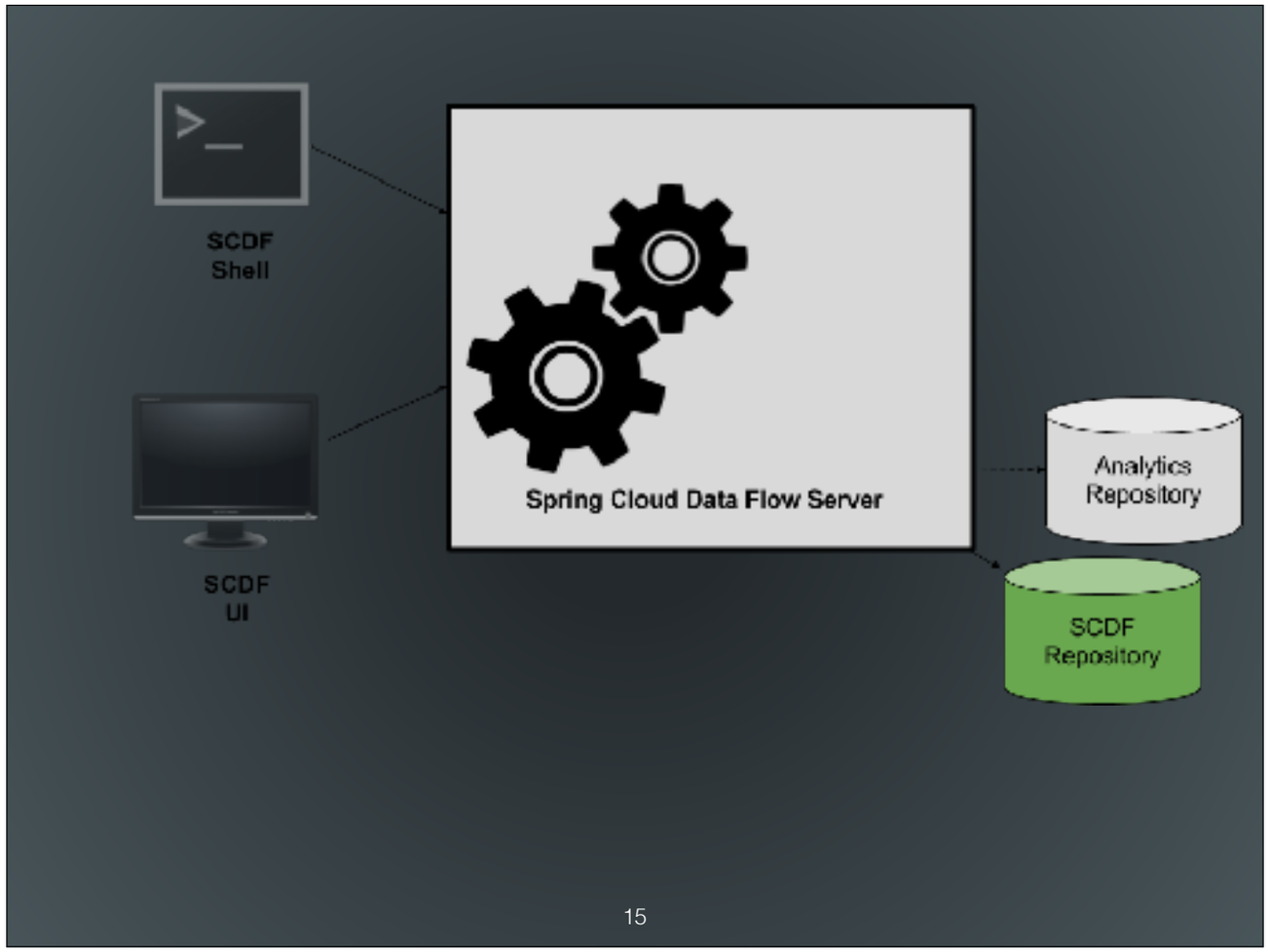
Spring Cloud Deployer

- Provides a common means to deploy applications to a platform
- Based on the Spring Cloud Deployer project https://github.com/spring-cloud/spring-cloud-deployer
- Each Spring Cloud Data Flow Server implementation uses one deployer. The current deployers that we support are:
    - CF
    - Mesos
    - Kubernetes
    - Yarn
    - Local
    - Others have been added by the community



SCDF Server Types

- Spring Cloud Dataflow has a separate server for each deployment type.
- Cloud Foundry - https://github.com/spring-cloud/spring-cloud-dataflow-server-cloudfoundry
- Mesos - https://github.com/spring-cloud/spring-cloud-dataflow-server-mesos
- Yarn - https://github.com/spring-cloud/spring-cloud-dataflow-server-yarn
- Kubernetes - https://github.com/spring-cloud/spring-cloud-dataflow-server-kubernetes
- Local -SPI
- But all are based on the Spring Cloud Data Flow SPI - https://github.com/spring-cloud/spring-cloud-dataflow
- Can you support multiple platforms on a single SCDF instance?
    - The answer is no. Each server supports only one platform.
- Why we are using Local
    - Meant for development purposes
    - Wanted to run it locally on your Machines
    - Wanted fast deployment to speed up labs
    - Wanted simple install (Yarn isn't easy to install)



SCDF Repository

- Is an external relational database that stores:
  - Stream Definitions
  - Task Definitions
  - URI’s to the apps
  - Task Execution Statuses
  - Job Statuses
- By default Local uses an embedded H2 database
- Currently supported (out of the box) H2, HSQLDB, MySQL, POSTGRESQL
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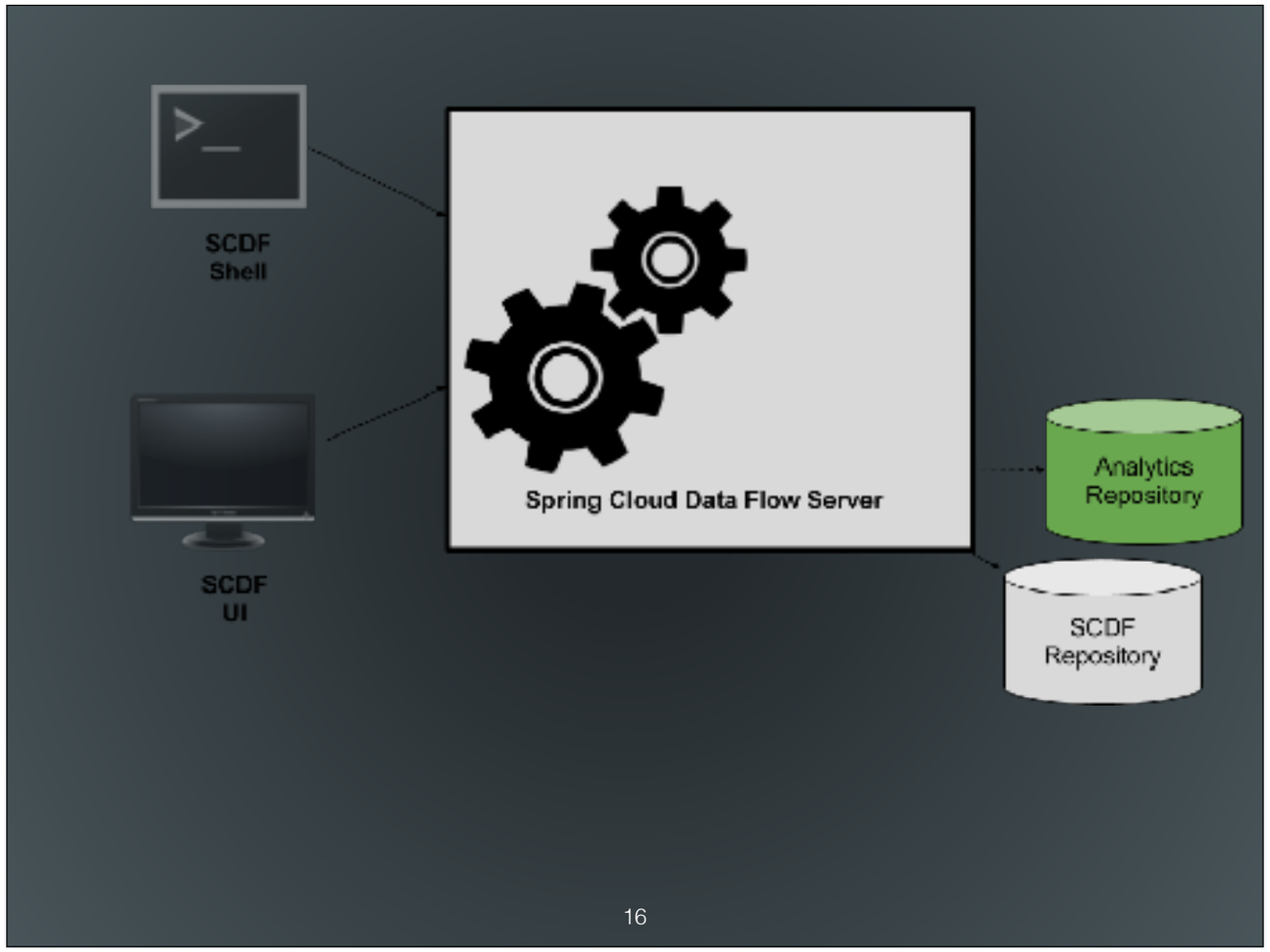
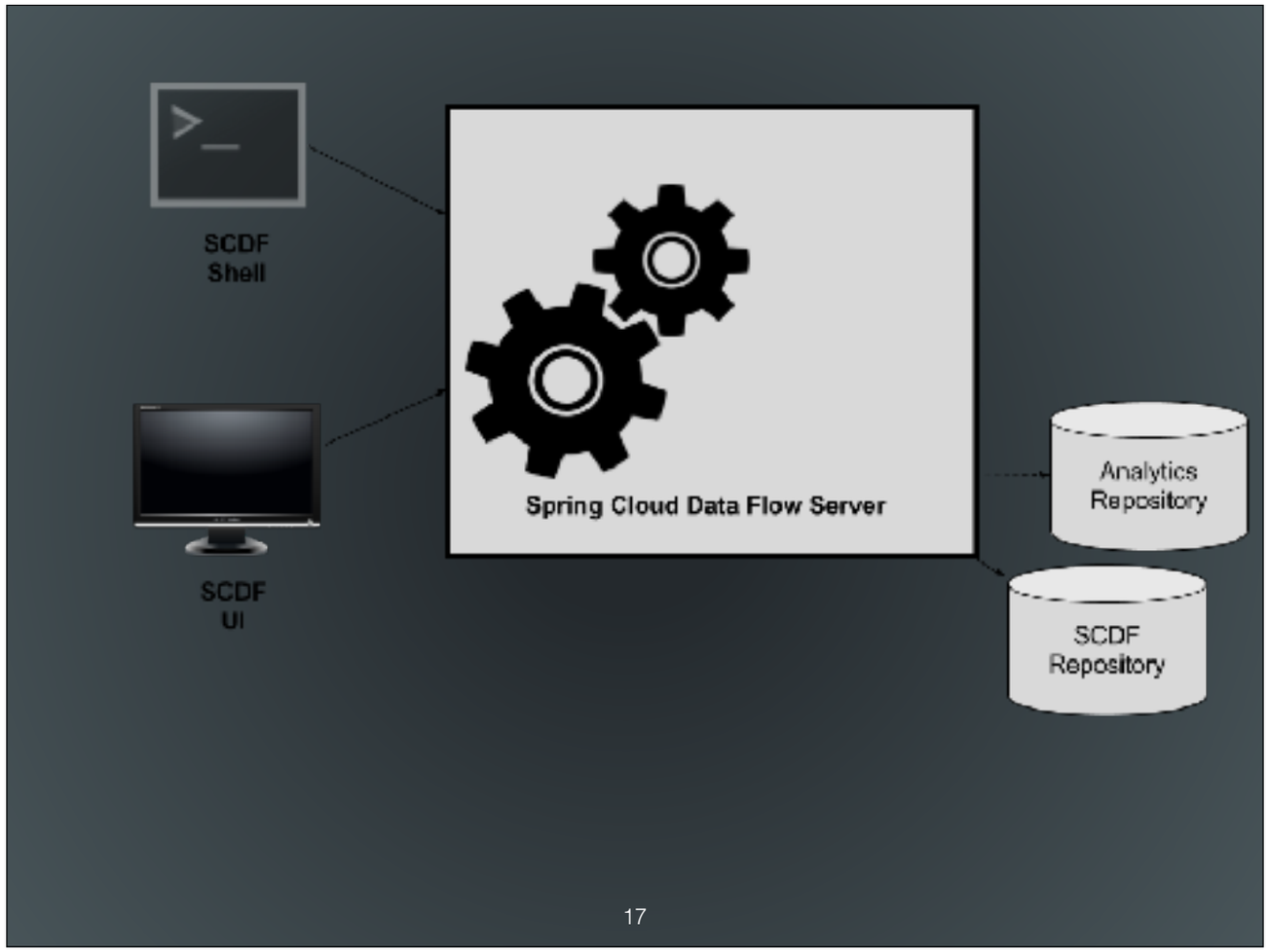


Analytics Repository

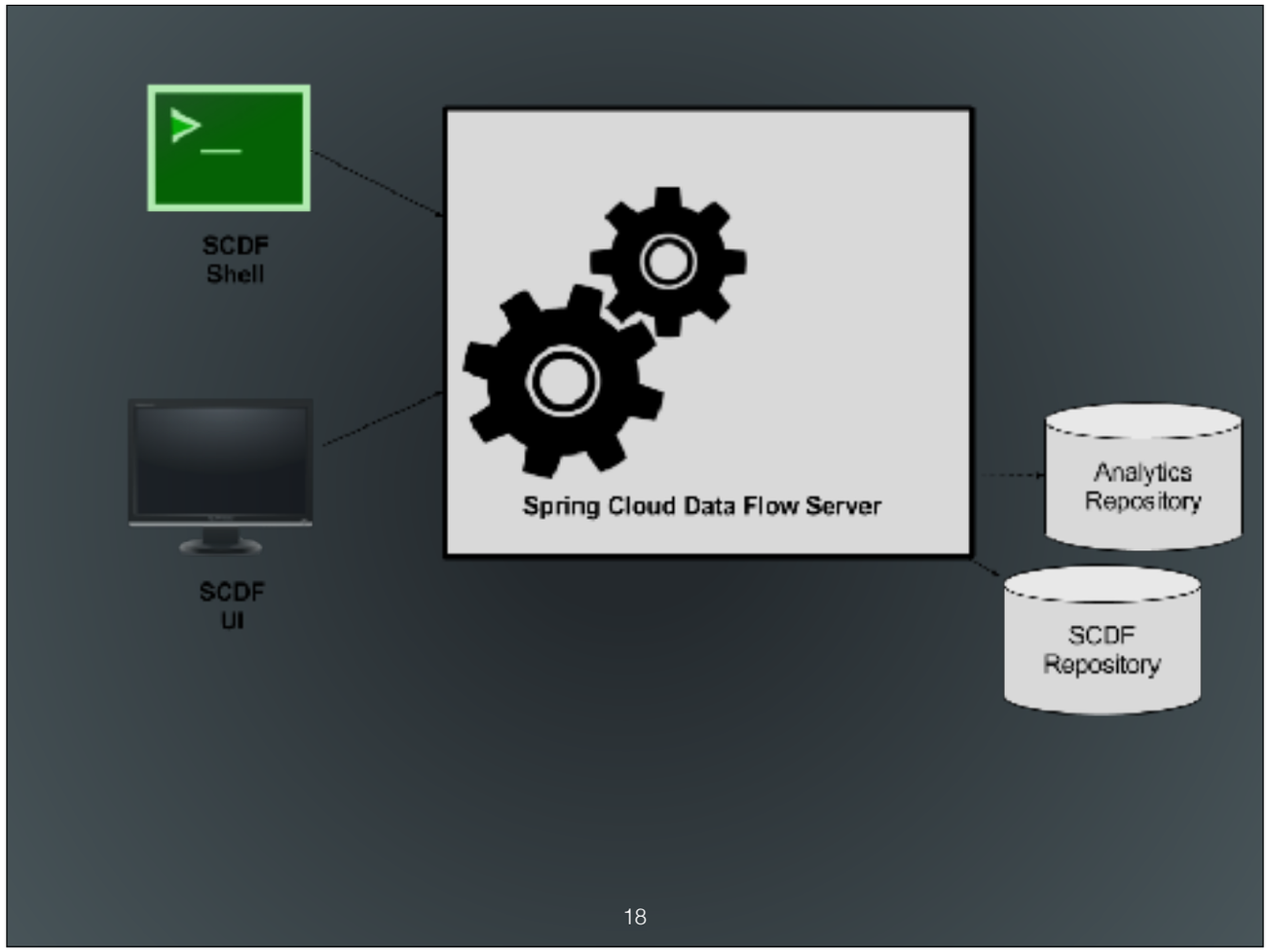
- Is an external Redis database that stores:
- Counts
- Aggregate-Counters
- Field Value Counters



SCDF UI

Offers an UI interface to the features offered by the RestfulAPI

- Accessible via the /dashboard endpoint ie. localhost:9393/dashboard
- Stream Creation, destruction and monitoring
- Task Creation, destruction and monitoring
- App registration
- Metrics montoring
- Job Monitoring



SCDF Shell

- Offers a command line interface to interface with the Restful API
- The shell has no real knowledge of the SCDF except what it gets from the Spring Cloud Data Flow Server
- Since it is a stand-alone app it can connect to any SCDF server that has its Restful API available for access
- By default it looks at localhost:9393/
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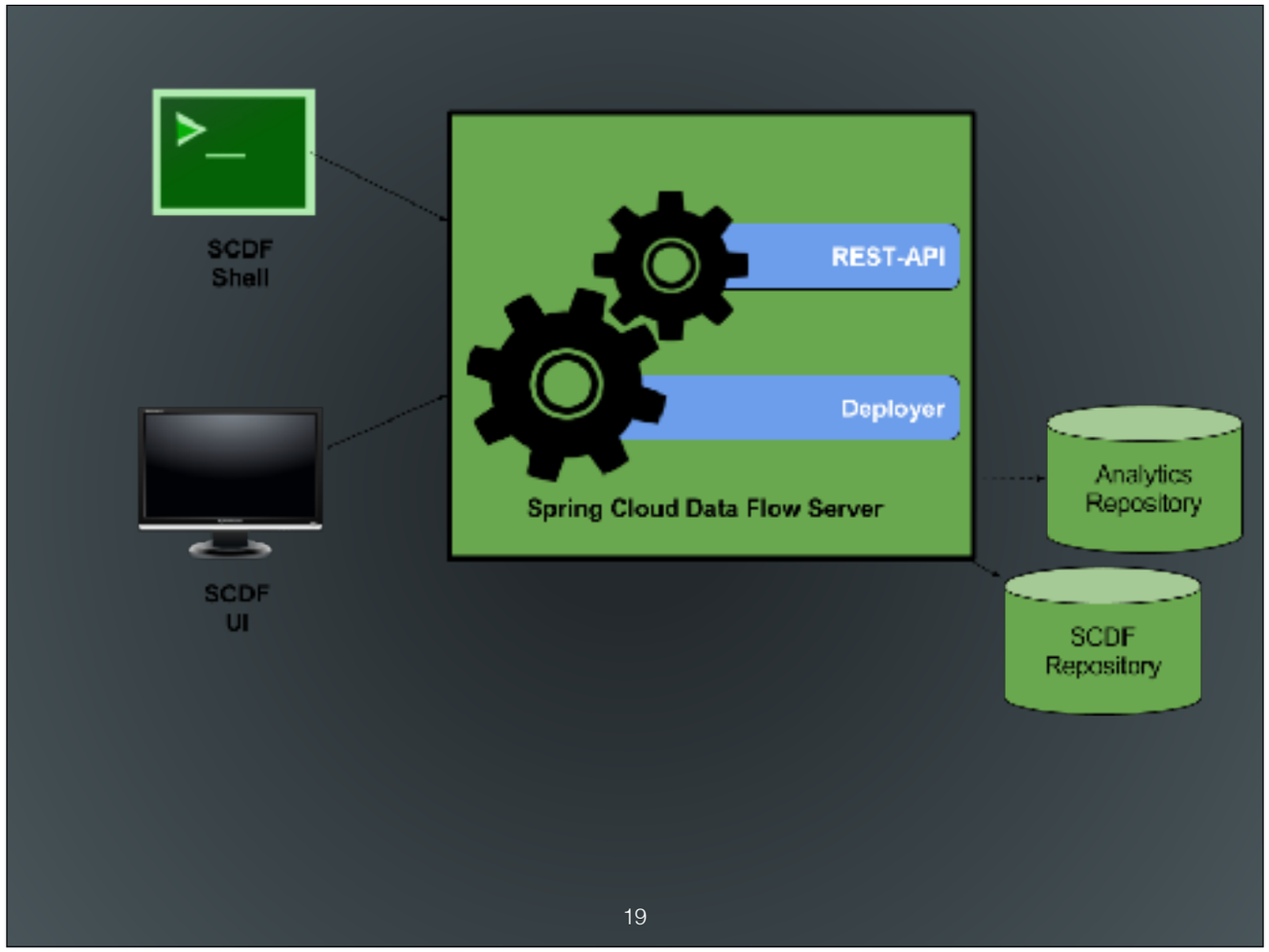
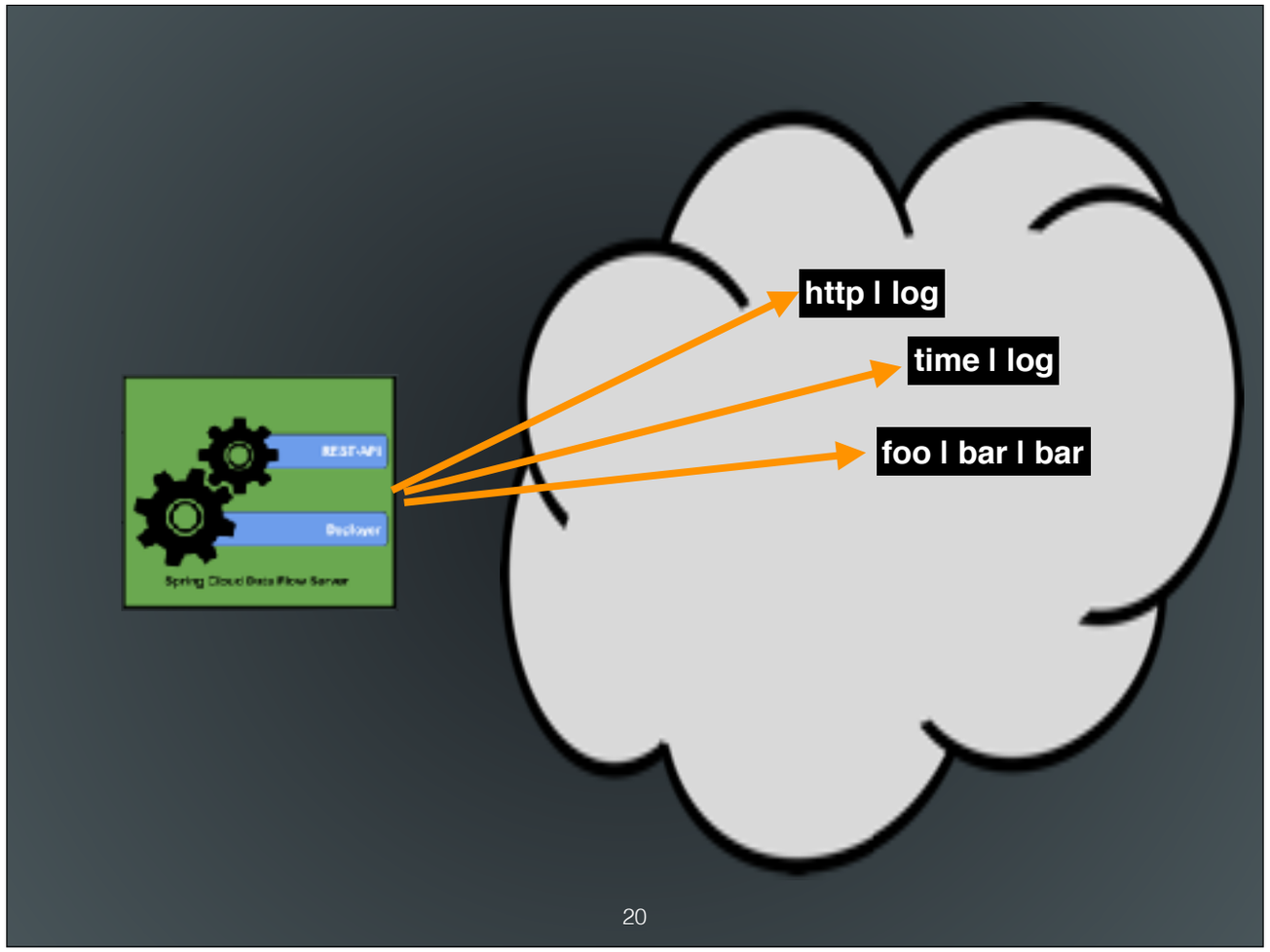
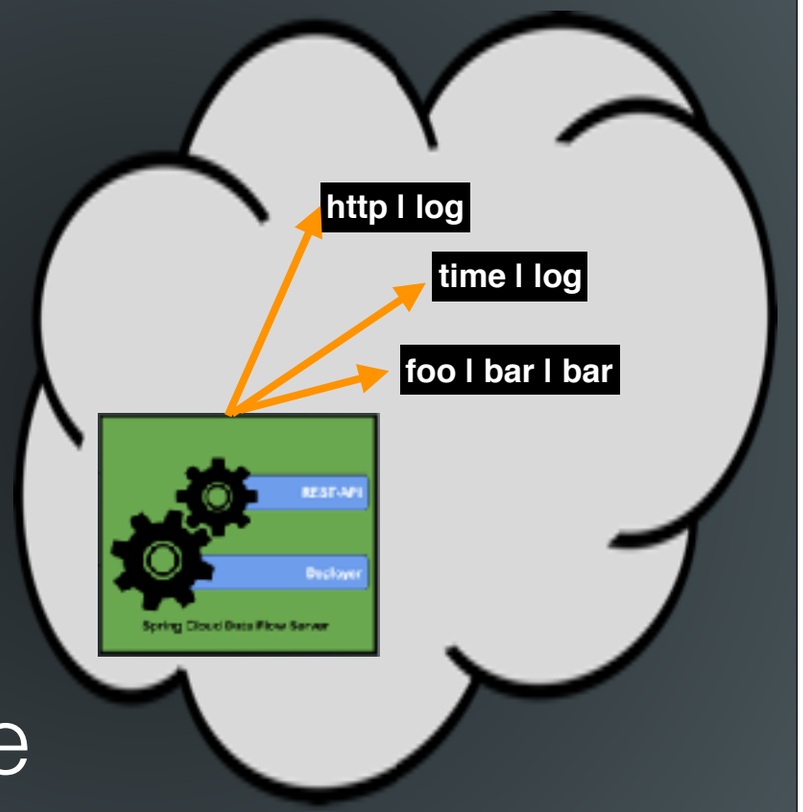


Now we have the basic components that makeup a SCDF Server.



Deployment Strategy 1 Run SCDF externally to the platform

Your Preference



Deployment Strategy 1 Run SCDF on the platform

- Startup Data Flow Server
- Startup Shell
- Startup Rabbit

Security!

- Https
- Basic Authentication via LDAP or File based
- Single Sign On OAuth
- Authorization will be added on 1.2
  https://flic.kr/p/igAH3a

Configuration

- Setup using typical Boot properties
  - Environment
  - command line
  - yaml
    - set location of yams file by using the following config: spring.config.location=<wherever>/application.yml
  - etc

https://flic.kr/p/oEFEGs

But, where are my apps?

- We invision using apps from a market place for apps.
- You may have special team that generates a specific type of apps and then you can re-use those apps.
    - i.e. DataScience Apps
- As we just discovered there are no apps
    - Spring Cloud Data Flow out of the box does not have a default set of apps that are available.
- You can register the apps that you want or
- You can import from our Spring Cloud App Starters if you wish to have a base set
    - app import --uri http://bit.ly/Avogadro-GA-stream-applications-rabbit-maven
- Now you can list the apps by executing an app list
- Get the details about a specific app i.e. app info <apptype>:appName
- Unregister the app. App unregister --name appName --type apptype
- App registration does not mean that the app has been pulled down to your server(when using https or maven).
    - It is only pulled into the maven repo or to file system when you deploy a stream, launch a task or execute app info

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```
app register --name http
--type source
--uri maven://
org.springframework.cloud.stream.app:http-
source-rabbit:1.1.1.RELEASE
```


Registration sample

- The registration command looks like the following: app register --name <yourappname> --type=<task,source,sink,processor> --uri=<thelocationofyourapp>
- We currently support the following URI resources for looking up the app
  - File
  - Http
  - Maven
  - Docker

https://flic.kr/p/9YxwXp

To Download or not to download?

Not yet.

If the jar uses a maven resource it will not pull down that jar (if it is not already in the repo) until:

- deploy a stream that uses it
- Execute an app info


```
app import
--uri file:///tmp/my-apps.properties
```

```
task.foo=file:///tmp/foo.jar
task.bar=file:///tmp/bar.jar
```


I can register one app at a time or I can import them from a flat file or via http:

For example you can download our Spring Cloud App stream Starters app definitions for a basic set of apps from the shell:

- app import --uri file:///tmp/my-apps.properties

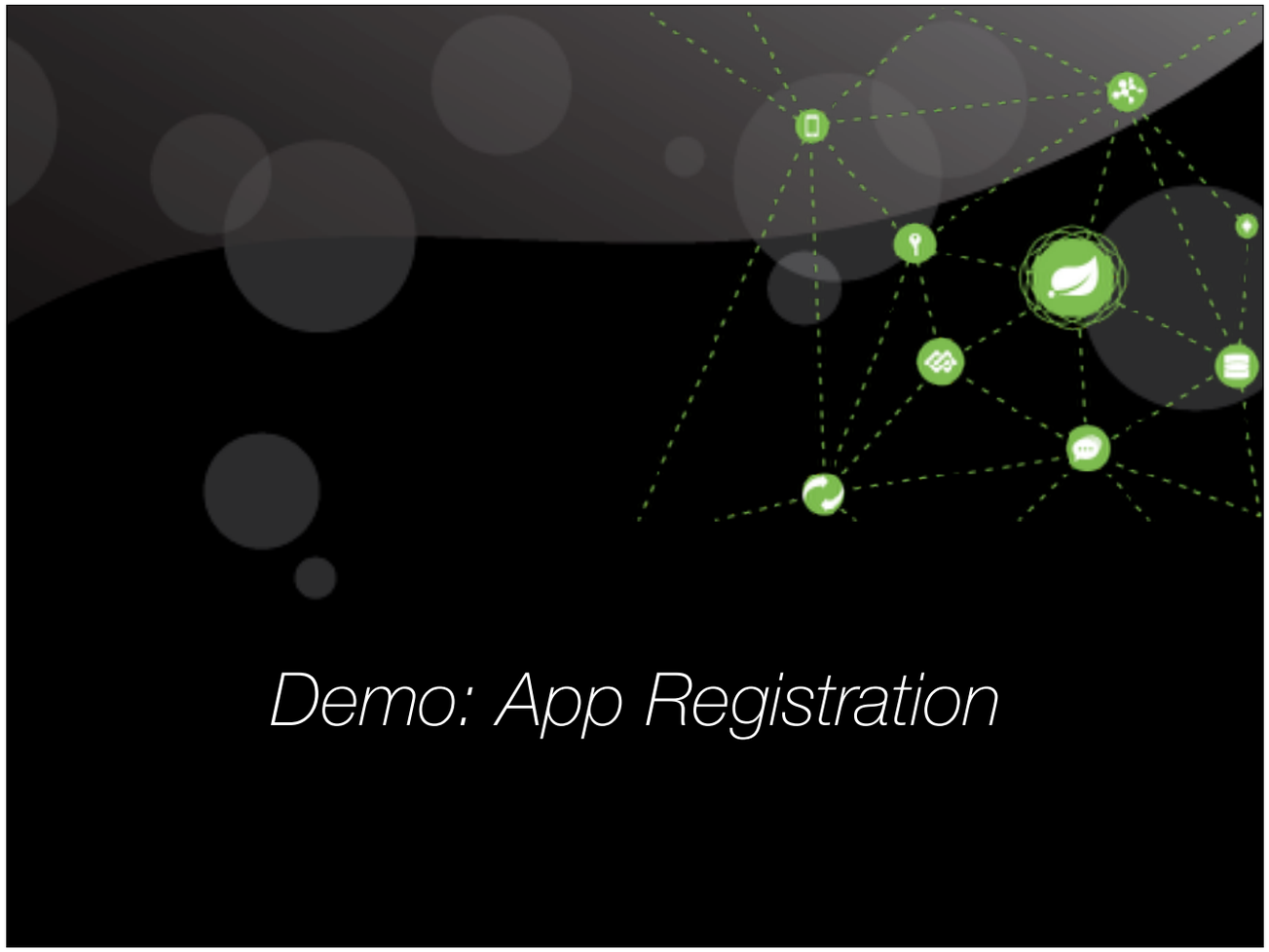

```
app list
```

```
app info --id source:http
```

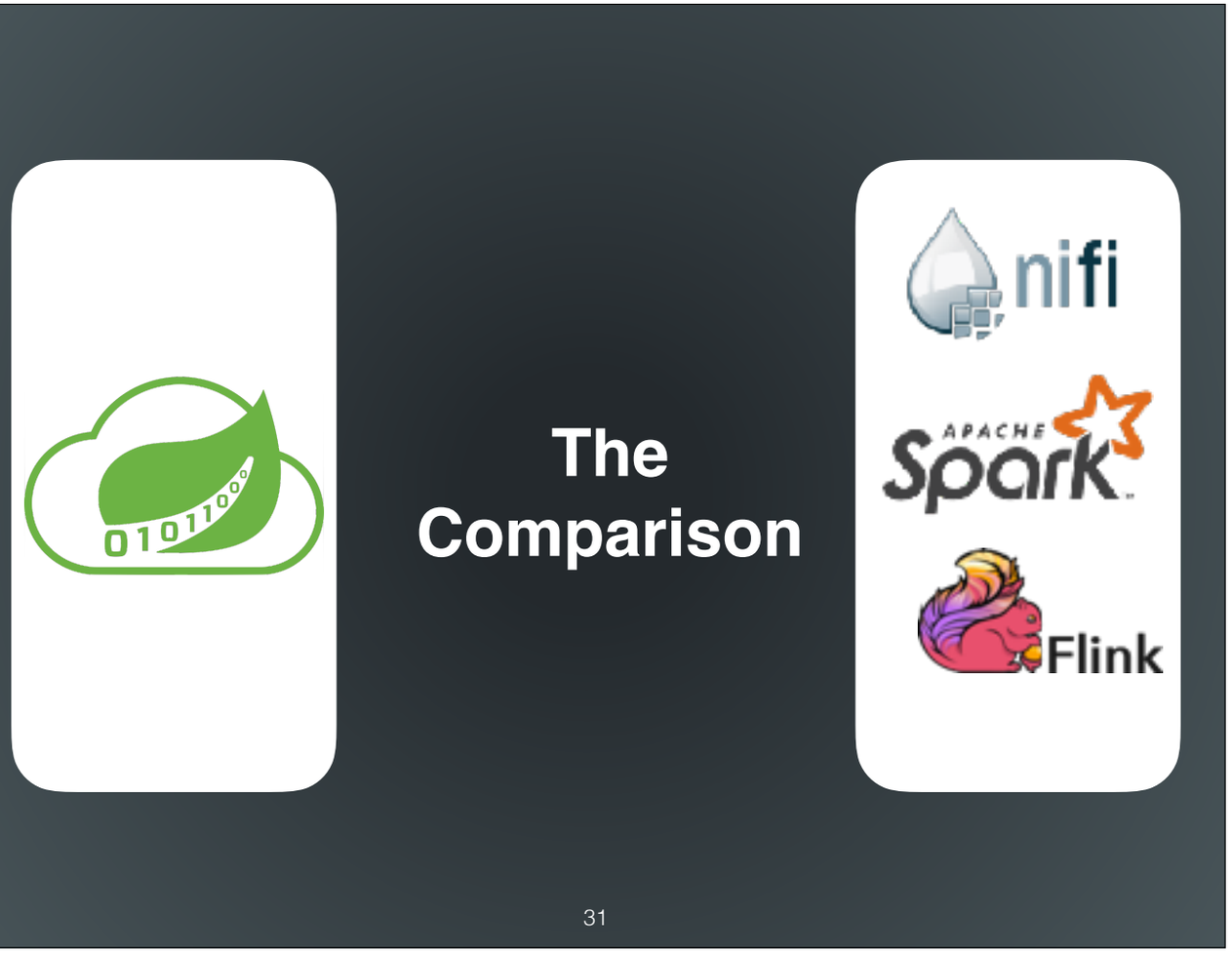
```
app unregister --name http --type source
```


Once apps are registered we can exercise them a little bit.

- app list - obtain a list of the available apps
- app info - get detailed information about your application.
    - What properties does the app support
    - What is the apps resource location
    - Note: the first time the app is access either by deployment or app info, it will take longer if it has to pull it from a remote location.
- Finally Remove the app from the registry

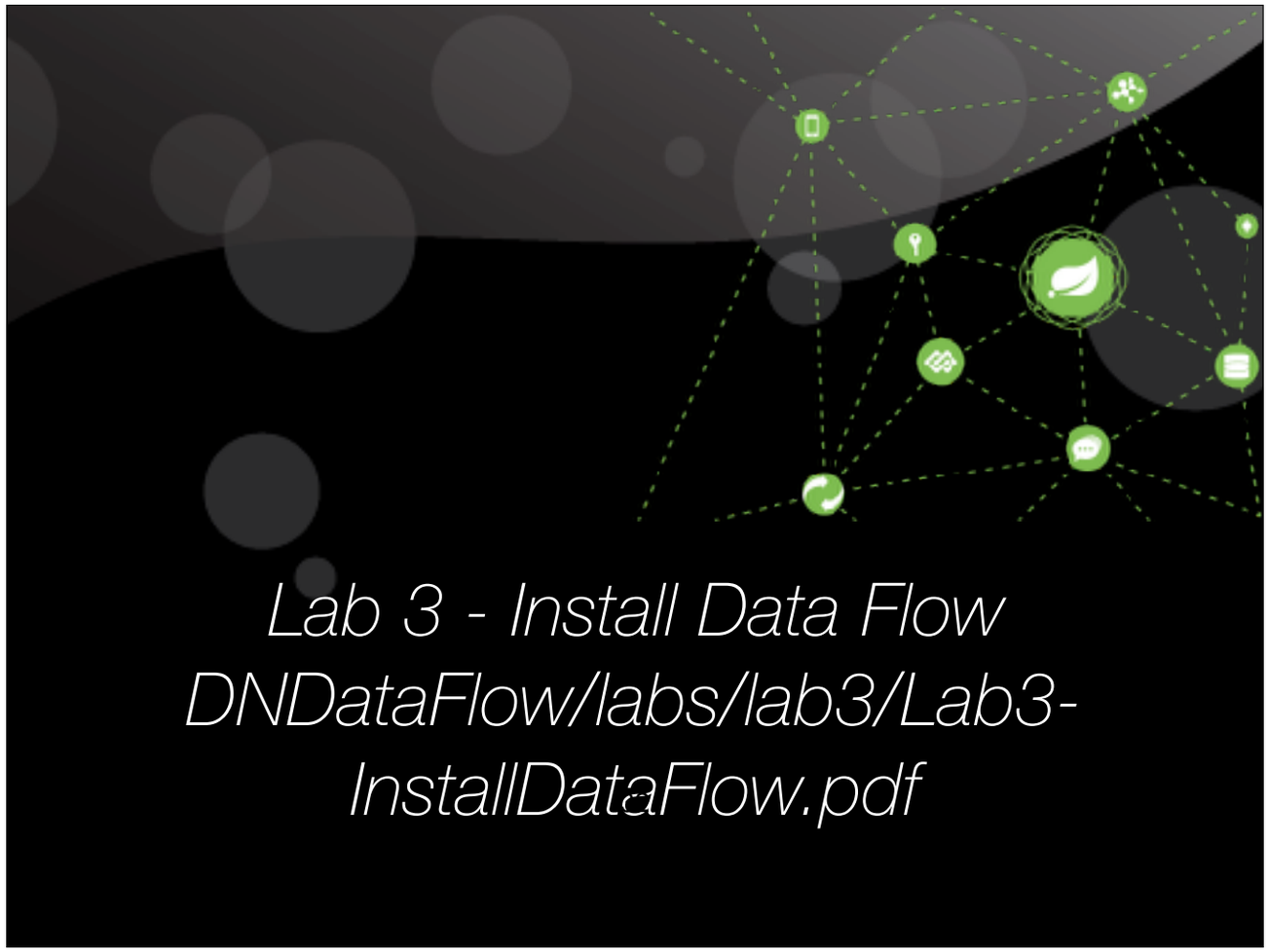


- Import apps
- App list
- App info
- Create basic stream
- Deploy stream
- Show where results go



Differences between SCDF and other platforms

- Apache Spark, Apache Flink, and Google Cloud Dataflow run on a dedicated compute engine cluster.
    - Compute engines gives these platforms a richer environment for performing complex calculations
    - But it introduces complexity of another execution environment that is often not needed when creating data centric applications.
        - You can real time data computations when using Spring Cloud Data Flow.
            - Refer to the analytics section in our docs.
                - Counting based use-cases
                - RxJava integration for functional API driven analytics use-cases, such as time-sliding-window and moving-average among others
- Each of these require a application execution cluster (like XD).
- Often, framework specific interfaces are required to be used in order to correctly “plug in” to the cluster’s execution framework.
- As we discovered during the evolution of Spring XD, the rise of multiple container frameworks in 2015 made creating our own runtime a duplication of efforts. When there are multiple runtime platforms that offer this functionality already.


Lab 3 - Install Data Flow
DNDataFlow/labs/lab3/Lab3-InstallDataFlow.pdf