Chapter 1: Go Language Basics

The Go Playground   Run   Format   ■ Imports   Share

```
 1 package main
 2
 3 import (
 4         "fmt"
 5 )
 6
 7 func main() {
 8         fmt.Println("Hello Readers!")
 9 }
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
```

Create a shareable link

Runs our program

Write your code here

```
Hello Readers!

Program exited.
```

Code runs here

Chapter 2: Go Language Essentials

Goroutine A   Channel   Goroutine B
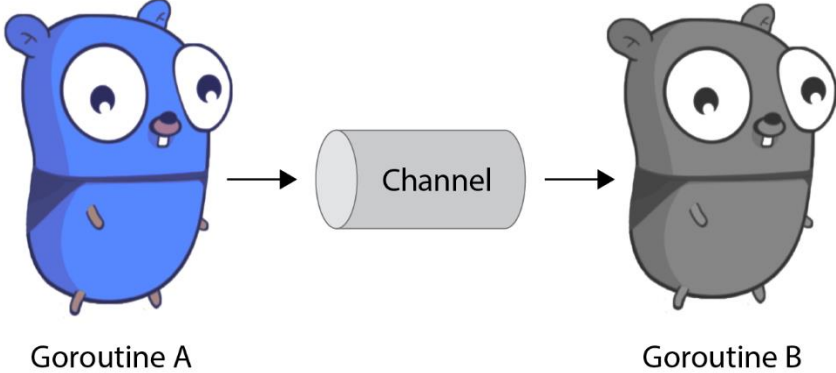
Chapter 3: Setting Up Your Environment

```
ubuntu@server0:~$ snap info go
name:      go
summary:   Go programming language compiler, linker, stdlib
publisher: Michael Hudson-Doyle (mwhudson)
store-url: https://snapcraft.io/go
contact:   michael.hudson@ubuntu.com
license:   BSD-3-Clause
description: |
  This snap provides an assembler, compiler, linker, and compiled libraries
  for the Go programming language.
snap-id: Md1HBASHzP4i0bniScAjXGnOII9cEK6e
channels:
  latest/stable:    1.17.5              2021-12-12 (8843) 92MB classic
  latest/candidate: ↑
  latest/beta:      ↑
  latest/edge:      devel-49b7c9caec 2021-12-13 (8848) 97MB classic
  1.17/stable:      1.17.5              2021-12-12 (8843) 92MB classic
```

Chapter 4: Filesystem Interactions

Chapter 5: Using Common Data Formats

No Images

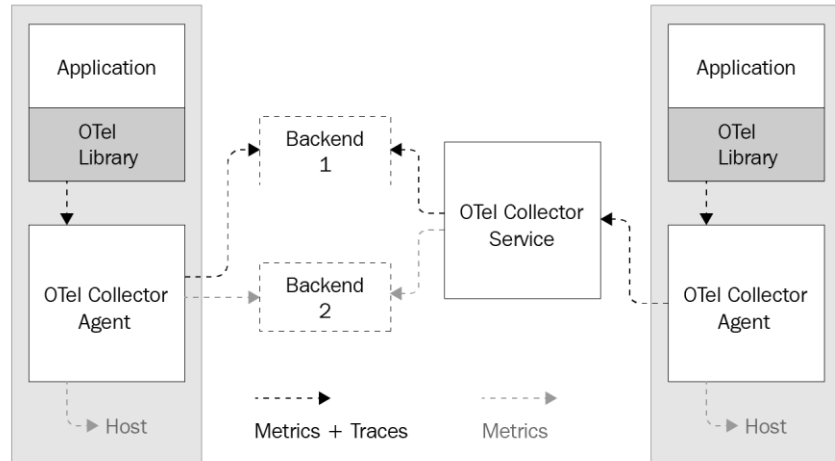# Chapter 6: Interacting with Remote Data Sources

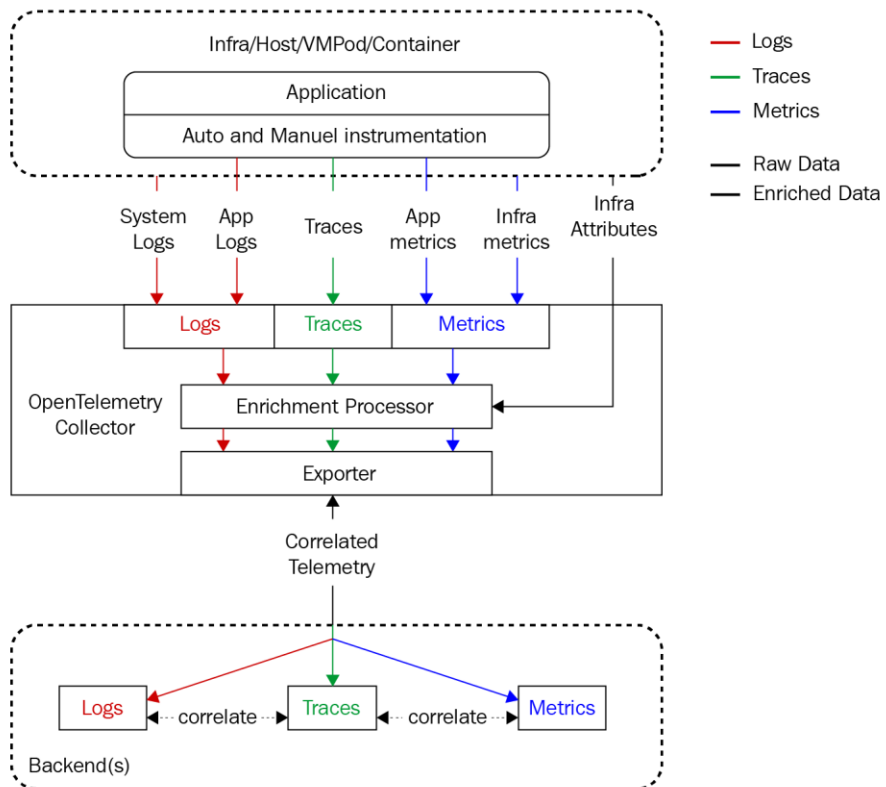*No Images*

Chapter 7: Writing Command-Line Tooling

Chapter 8: Automating Command-Line Tasks

No Images

Chapter 9: Observability with OpenTelemetry

OpenTelemetry Collection

← ⌄ **demo-client: ExecuteRequest** 04da6a5   Find... ⊙ ∧ ∨ ✕   ⌘   Trace Timeline ⌄

Trace Start **January 3 2022, 11:44:21**.439   Duration **8.64ms**   Services **2**   Depth **3**   Total Spans **3**

| 0µs | 2.16ms | 4.32ms | 6.48ms | 8.64ms |

Service & Operation   ⌄ › ⌄ »   0µs   2.16ms   4.32ms   6.48ms   8.64ms

⌄ | **demo-client** ExecuteRequest

⌄ | **demo-client** HTTP GET   8

| **demo-server** /hello   6.41ms

/hello

Service: **demo-server** | Duration: **6.41ms** | Start Time: **1.78ms**

⌄ Tags

http.scheme	http
http.server_name	/hello
http.status_code	200
http.target	/hello
http.user_agent	Go-http-client/1.1
http.wrote_bytes	11
internal.span.format	proto
net.host.name	demo-server
net.host.port	7080
net.peer.ip	172.23.0.6
net.peer.port	39598
net.transport	ip_tcp
otel.library.name	go.opentelemetry.io/contrib/instrumtation/net/http/otelhttp
otel.library.version	semver:0.27.0
server-attribute	foo

› **Process:** host.name = faafa1e760c8 | process.command_args = ["/go/bin/main"] | process.executable.name = main | process.executable...

SpanID: bfce9c9297f7c08c 🔗

← ⌄ **demo-client: ExecuteRequest** ddc9b3a   Find...   ⊙ ∧ ∨ ✕   ⌘   Trace Timeline ⌄

Trace Start **January 4 2022, 10:03:26.862**   Duration **2.28ms**   Services **2**   Depth **3**   Total Spans **3**

| 0μs | 569.5μs | 1.14ms | 1.71ms | 2.28ms |

Service & Operation   ⌄ › ≫ ≫

| | 0μs | 569.5μs | 1.14ms | 1.71ms | 2.28ms |

⌄ demo-client ExecuteRequest

ExecuteRequest   Service: **demo-client**   Duration: **2.28ms**   Start Time: **0μs**

› **Tags:**   internal.span.format = proto   otel.library.name = demo-client-tracer   span.kind = internal

› **Process:**   host.name = ff1744dffb28   process.command_args = ["/go/bin/main"]   process.executable.name = main   process.executable.pat...

⌄ **Logs** (1)

⌄ **2.28ms**

| message | successfully finished request operation |
| someKey | someValue |

Log timestamps are relative to the start time of the full trace.

SpanID: 22dd793915bce279 🔗

⌄ **demo-client** HTTP GET   2.09m

⌄ demo-server /hello   96μs

☐ Use local time   ☐ Enable query history   ☑ Enable autocomplete   ☑ Enable highlighting   ☑ Enable linter

🔍   rate(demo_server_request_counts[2m])   🌐   **Execute**

Table | Graph   Load time: 13ms   Resolution: 14s   Result series: 1

− 1h +   ‹   End time   ›   Res. (s)   📈 📊   Show Exemplars

■ {instance="otel-collector:8889", job="otel-collector", label1="value1", server_attribute="foo"}

Remove Panel

☑ Inactive (1) ☑ Pending (0) ☑ Firing (0)   🔍 Filter by name or labels   ☐ Show annotations

/etc/prometheus/rules/demo-server.yml > demo-server   inactive

∨ **HighRequestLatency** (0 active)

```
name: HighRequestLatency
expr: histogram_quantile(0.5, rate(http_server_duration_bucket{exported_job="demo-server"}[5m])) > 200000
labels:
    severity: page
annotations:
    summary: High request latency
```

☑ Inactive (0) ☑ Pending (0) ☑ Firing (1)   🔍 Filter by name or labels   ☐ Show annotations

/etc/prometheus/rules/demo-server.yml > demo-server   firing (1)

∨ **HighRequestLatency** (1 active)

```
name: HighRequestLatency
expr: histogram_quantile(0.5, rate(http_server_duration_bucket{exported_job="demo-server"}[5m])) > 200000
labels:
    severity: page
annotations:
    summary: High request latency
```

Chapter 10: Automating Workflows with GitHub Actions

✓ **my first action** first-workflow #1   ⟳ Re-run jobs ▾   •••

⌂ Summary

Jobs

✓ echo

echo
succeeded 9 minutes ago in 2s   🔍 Search logs   ⚙

✓ Set up job   1s

```
 1   Current runner version: '2.281.1'
 2   ▸ Operating System
 6   ▸ Virtual Environment
11   ▸ Virtual Environment Provisioner
13   ▸ GITHUB_TOKEN Permissions
26   Prepare workflow directory
27   Prepare all required actions
```

✓ echo step   1s

```
 1   ▸ Run echo 'Hello World!'
 4   Hello World!
```

✓ Complete job   0s

```
 1   Cleaning up orphan processes
```

Add more commits by pushing to the `ci-workflow` branch on **devopsforgo/github-actions**.

○ **Some checks haven't completed yet**
1 successful and 5 in progress checks   Hide all checks

✓ ⬤ ci / test (1.16.x, ubuntu-latest) (pull_request)   Successful in 7s   Details

● ⬤ ci / test (1.16.x, macos-latest) (pull_request)   In progress — This check has started...   Details

● ⬤ ci / test (1.16.x, windows-latest) (pull_request)   In progress — This check has started...   Details

● ⬤ ci / test (1.17.x, ubuntu-latest) (pull_request)   In progress — This check has started...   Details

● ⬤ ci / test (1.17.x, macos-latest) (pull_request)   In progress — This check has started...   Details

● ⬤ ci / test (1.17.x, windows-latest) (pull_request)   In progress — This check has started...   Details

✓ **This branch has no conflicts with the base branch**
Merging can be performed automatically.

[Merge pull request ▼]   or view command line instructions.

‹› Code   ⊙ Issues   ⇅ Pull requests   ⊙ Actions   ▥ Projects   ⊙ Security   ⩘ Insights   ⚙ Settings

✓ **Merge pull request #9 from devopsforgo/remove-jq** tweeter-automation #24   [⟳ Re-run all jobs]   [···]

⌂ **Summary**

Jobs

✓ test (1.16.x, ubuntu-latest)

✓ test (1.16.x, macos-latest)

✓ test (1.16.x, windows-latest)

✓ test (1.17.x, ubuntu-latest)

✓ test (1.17.x, macos-latest)

✓ test (1.17.x, windows-latest)

✓ release

Triggered via push 2 hours ago	Status	Total duration	Billable time
🔵 devinged pushed -o- 3f3df0d `v0.0.1`	**Success**	**2m 32s**	**4m 1s**

Artifacts
—

tweeter-automation.yaml
on: push

Matrix: test

✓ 6 jobs completed ————————● ● ✓ release   1m 2s
Show all jobs

[⛶] [—] [+]

✅ **Merge pull request #9 from devopsforgo/remove-jq** tweeter-automation #24   🔄 Re-run all jobs   ...

🏠 Summary

Jobs

✅ test (1.16.x, ubuntu-latest)

✅ test (1.16.x, macos-latest)

✅ test (1.16.x, windows-latest)

✅ test (1.17.x, ubuntu-latest)

✅ test (1.17.x, macos-latest)

✅ test (1.17.x, windows-latest)

✅ **release**

release
succeeded 2 hours ago in 1m 2s   🔍 Search logs   ⚙

> ✅ Set up job		4s
> ✅ Run actions/checkout@v2		1s
> ✅ Set RELEASE_VERSION ENV var		0s
> ✅ Run actions/setup-go@v2		1s
> ✅ install gox		1s
> ✅ build cross-platform binaries		50s
> ✅ generate release notes		1s
> ✅ gzip the bins		2s
> ✅ create release		2s
> ✅ Post Run actions/checkout@v2		0s
> ✅ Complete job		0s

Compare ▾

v0.0.1

Edit

⬡ **github-actions** released this 2 hours ago

What's Changed

New Features 🎉

- create tweeter continuous integration automation workflow by **@devigned** in #1
- Create tweeter release automation workflow by **@devigned** in #2
- wrap errors to provide better messaging by **@devigned** in #5

Bug Fixes 🐛

- remove the `ls -la` from the gox step of the release by **@devigned** in #4

Other Changes

- add snapshots of the release workflow by **@devigned** in #3

New Contributors

- **@devigned** made their first contribution in #1

Full Changelog: https://github.com/devopsforgo/github-actions/commits/v0.0.1

Contributors

devigned

☺

▾ **Assets** 7

⬡ **tweeter_osx_amd64**	3.46 MB
⬡ **tweeter_osx_arm64**	3.31 MB
⬡ **tweeter_linux_amd64**	3.58 MB
⬡ **tweeter_linux_arm64**	3.27 MB
⬡ **tweeter_windows_amd64**	3.46 MB
🗎 **Source code** (zip)	
🗎 **Source code** (tar.gz)	

✓ Create tweeter action and dockerfile tweeter-automation #33

⟳ Re-run all jobs   ···

⌂ **Summary**

Jobs

- ✓ test (1.16.x, ubuntu-latest)
- ✓ test (1.16.x, macos-latest)
- ✓ test (1.16.x, windows-latest)
- ✓ test (1.17.x, ubuntu-latest)
- ✓ test (1.17.x, macos-latest)
- ✓ test (1.17.x, windows-latest)
- ✓ test-action
- ⊘ release

Triggered via pull request 2 minutes ago

● devigned synchronize #10 `tweeter-action`

Artifacts
—

Status	Total duration	Billable time
Success	**1m 16s**	**3m 56s**

tweeter-automation.yaml
on: pull_request

Matrix: test

✓ 6 jobs completed
Show all jobs   ●—●   ⊘ release   0s

✓ test-action   54s

⤢   −   +

✅ Create tweeter action and dockerfile tweeter-automation #33

🔄 Re-run all jobs   ⋯

🏠 Summary

Jobs

✅ test (1.16.x, ubuntu-latest)

✅ test (1.16.x, macos-latest)

✅ test (1.16.x, windows-latest)

✅ test (1.17.x, ubuntu-latest)

✅ test (1.17.x, macos-latest)

✅ test (1.17.x, windows-latest)

✅ **test-action**

⊘ release

test-action
succeeded 2 minutes ago in 54s

🔍 Search logs   ⚙

> ✅ Set up job	3s
> ✅ Run actions/checkout@v2	1s
> ✅ test the tweeter action in DRY_RUN	49s
> ✅ Run echo hello world! from dry run test	0s
> ✅ Post Run actions/checkout@v2	0s
> ✅ Complete job	1s

✅ Merge pull request #11 from devopsforgo/image-version-read release image #2

🔄 Re-run all jobs   ⋯

🏠 **Summary**

Jobs

✅ image

Triggered via push 1 minute ago
🐙 deviged pushed ⊶ ee9fd19 `image-v1.0.0`

Artifacts
–

Status	Total duration	Billable time
Success	**59s**	**47s**

image-release.yaml
on: push

✅ image	47s

⛶ − +

✅ Merge pull request #11 from devopsforgo/image-version-read release image #2   ⟳ Re-run all jobs   ···

⌂ Summary

Jobs

✅ **image**

image		
succeeded 1 minute ago in 47s	🔍 Search logs	⚙

✅ Set up job		5s
✅ Run actions/checkout@v2		1s
✅ set env		0s
✅ setup buildx		4s
✅ login to GitHub container registry		1s
✅ build and push		34s
✅ Post build and push		1s
✅ Post login to GitHub container registry		0s
✅ Post setup buildx		1s
✅ Post Run actions/checkout@v2		0s
✅ Complete job		0s

✓ **replace the Dockerfile in the action metadata** tweeter-automation #48   ↻ Re-run all jobs   •••

⌂ **Summary**

Jobs

✓ test (1.16.x, ubuntu-latest)

✓ test (1.16.x, macos-latest)

✓ test (1.16.x, windows-latest)

✓ test (1.17.x, ubuntu-latest)

✓ test (1.17.x, macos-latest)

✓ test (1.17.x, windows-latest)

✓ test-action

⊘ release

Triggered via pull request 6 minutes ago
● devigned synchronize #12 `replace-image`

Artifacts
—

Status
Success

Total duration
1m 20s

Billable time
3m 30s

tweeter-automation.yaml
on: pull_request

Matrix: test

✓ 6 jobs completed
Show all jobs

⊘ release   0s

✓ test-action   11s

⛶ — +

Options

Manage access

Security & analysis

Branches

Webhooks

Notifications

Integrations

Deploy keys

Actions

Secrets

Actions
Codespaces
Dependabot

Pages

Actions secrets

[New repository secret]

Secrets are environment variables that are **encrypted**. Anyone with **collaborator** access to this repository can use these secrets for Actions.

Secrets are not passed to workflows that are triggered by a pull request from a fork. Learn more.

Repository secrets

🔒 ACCESS_TOKEN   Updated 1 minute ago   [Update] [Remove]

🔒 ACCESS_TOKEN_SECRET   Updated 32 seconds ago   [Update] [Remove]

🔒 API_KEY   Updated 17 seconds ago   [Update] [Remove]

🔒 API_KEY_SECRET   Updated now   [Update] [Remove]

Secrets can also be created at the organization level and authorized for use in this repository.

Organization secrets

Organization secrets can only be used by public repositories on your plan.

If you would like to use organization secrets in a private repository, you will need to upgrade your plan.

Chapter 11: Using ChatOps to Increase Efficiency
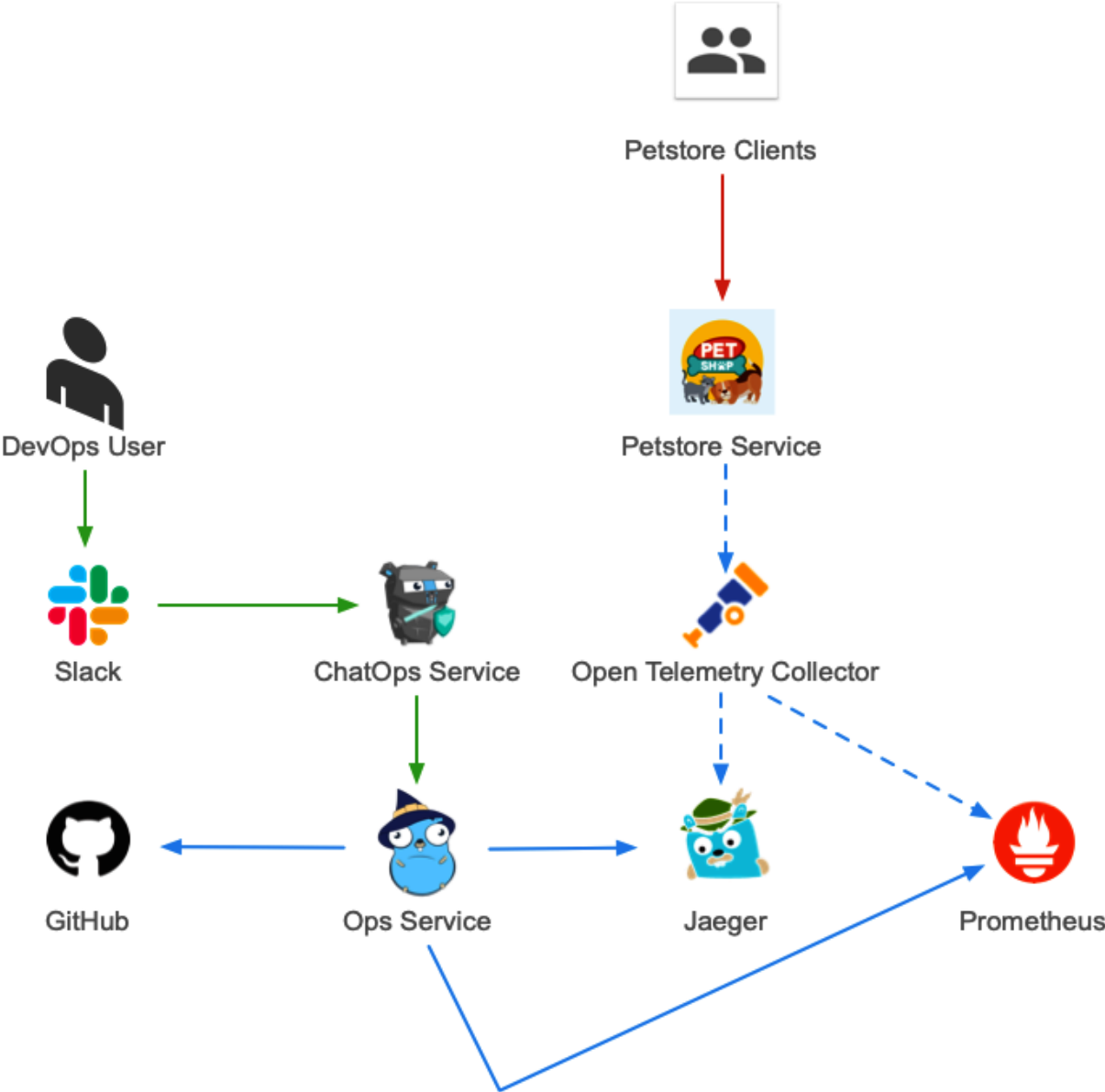
Create an app ✕

Choose how you'd like to configure your app's scopes and settings.

From scratch

Use our configuration UI to manually add basic info, scopes, ›
settings, & features to your app.

From an app manifest `BETA`

Use a manifest file to add your app's basic info, scopes, ›
settings & features to your app.

Need help? Check our <u>documentation</u>, or <u>see an example</u>

Pick a workspace to develop your app

✕

Pick a workspace to develop your app in:

🟥 **GoForDevops**	⌄

Keep in mind that you can't change this app's workspace later. If you leave the workspace, you won't be able to manage any apps you've built for it.

Sign into a different workspace

Step 1 of 3

Cancel   **Next**

Enter app manifest below BETA ✕

This is your app's manifest containing basic info, scopes, settings, and features. For help on how this works, you can check out our documentation or check out a few examples.

YAML   JSON

```
1  display_information:
2    name: Demo App
3  settings:
4    org_deploy_enabled: false
5    socket_mode_enabled: false
6    is_hosted: false
7    token_rotation_enabled: false
8
```

Step 2 of 3   Back   Next

Review summary & create your app ✕

Ok

Bot Scopes (15)

app_mentions:read, channels:history, channels:join, chat:write, chat:write.public, commands, files:write, groups:read, incoming-webhook, links:write, usergroups:read, users.profile:read, users:read, chat:write.customize, im:read

Step 3 of 3   **Back**   **Create**

App-Level Tokens

App-level tokens allow your app to use platform features that apply to multiple (or all) installations—for example, the API to list event authorizations. Features have distinct scopes, so request only the scopes for the features you need. Each app can have a maximum of 10 app-level tokens at one time.

Tokens

Generate Token and Scopes

Generate an app-level token

✕

Token Name

This will be how you refer to your token

Scopes to be accessed by this token

Scope	Description

You haven't added any scopes for your app-level token.

Add Scope

Cancel   Generate

Properties of an app level token

Generated By

johnsiilver

Date Generated

February 19th, 2022

Token

| xapp-1-A033F765MHV-3134167306244-0bb2 | Copy | Revoke |

Scope

connections:write   Route your app's interactions and event payloads over WebSockets

authorizations:read   View information about your app's authorizations on installed teams

Done

OAuth Tokens for Your Workspace

These OAuth Tokens will be automatically generated when you finish connecting the app to your workspace. You'll use these tokens to authenticate your app.

Install to Workspace

johnsiilver 6:08 PM
@PetStore help

PetStore `APP` 6:08 PM
Here are all the commands that I can help you with:
change sampling
list traces
show trace
You can get more help by saying `help <cmd>` with a command from above.

johnsiilver 6:11 PM
@PetStore help list traces

Today ⌄

PetStore `APP` 6:11 PM
I can help you waith that:

list traces <opt1=val1 op2=val2>
Ex: list traces operation=AddPets() limit=5

list traces returns a list of Open Telemetry traces. Various
options are provided to allow for filtering what traces you see.

johnsiilver 6:14 PM
@PetStore list traces limit=5

PetStore `APP` 6:14 PM
Here are the traces you requested:

```
+----------------+----------------------------------------------------+
| START TIME(UTC) |                 TRACE ID                         |
+----------------+----------------------------------------------------+
| 02/18/2022 26:55 | http://127.0.0.1:16686/trace/0a4181770cec837941fef132bfe2ec74 |
| 02/18/2022 26:40 | http://127.0.0.1:16686/trace/0210925247e006111ac8dcd6f69d1d83 |
| 02/18/2022 26:39 | http://127.0.0.1:16686/trace/14b360090342de74b5d1bf5fcf051f57 |
| 02/18/2022 26:36 | http://127.0.0.1:16686/trace/01c0f6bd606f2ad5a5b0f74ba22196e1 |
| 02/18/2022 26:36 | http://127.0.0.1:16686/trace/02728525846e8f16986cf792aed6bf83 |
+----------------+----------------------------------------------------+
```

johnsiilver 6:17 PM
@PetStore show trace 0a4181770cec837941fef132bfe2ec74

PetStore `APP` 6:17 PM
johnsiilver,
Here is the trace info you requested:

Here is some basic trace data:
```
+-----------+-------------------------------------------------------------+
| ID        | 0a4181770cec837941fef132bfe2ec74                            |
| Duration  | 346.333µs                                                   |
| Jaeger URL | http://127.0.0.1:16686/trace/0a4181770cec837941fef132bfe2ec74 |
| Had Errors | false                                                      |
+-----------+-------------------------------------------------------------+
```

Here are the operations in the trace:
```
+------------------+
| server.AddPets() |
+------------------+
```

Chapter 12: Creating Immutable Infrastructure Using Packer

No Images

Chapter 13: Infrastructure as Code with Terraform
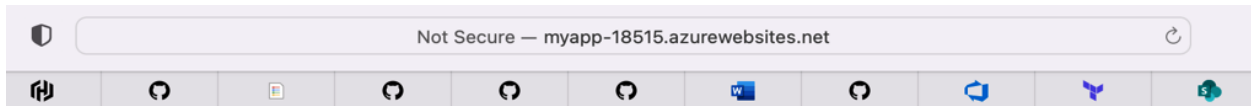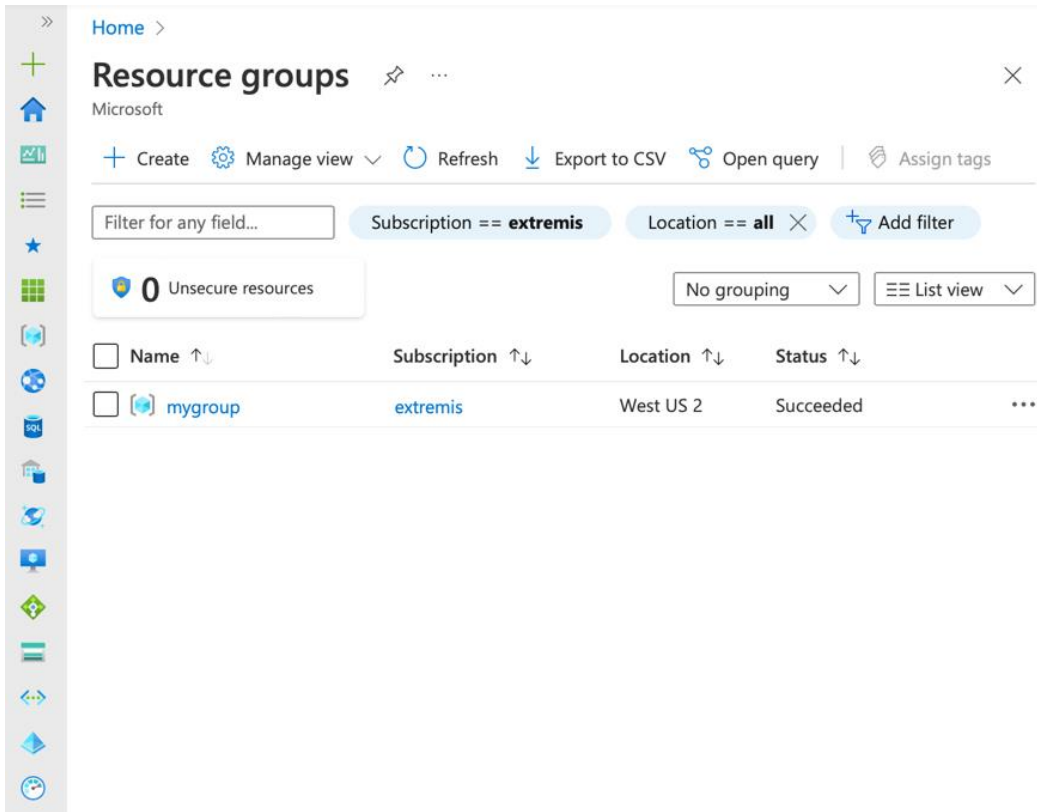
NGINX

Server address: 169.254.129.2:80

Server name: 32d2373a1778

Date: 02/Apr/2022:23:27:07 +0000

URI: /

Auto Refresh

Chapter 14: Deploying and Building Applications in Kubernetes

✓ (Tiltfile)   1m ago
  Completed in 0.8s

  petstore-service   — ⊗
  Updating...

  petstore-operator-contro... — ⊗
  Updating...

  uncategorized   1m ago
  Completed in 1.8s

```
petstore-service   → go: found google.golang.org/grpc/reflection in google.golang.org/grpc v1.44.0
petstore-service   → go: found google.golang.org/grpc/status in google.golang.org/grpc v1.44.0
petstore-service   → go: found google.golang.org/protobuf/proto in google.golang.org/protobuf v1.27.1
petstore-service   → go: found github.com/biogo/store/llrb in github.com/biogo/store v0.0.0-20201120204734-aad293a2328f
petstore-service   → go: found go.opentelemetry.io/otel in go.opentelemetry.io/otel v1.4.1
petstore-service   → go: found go.opentelemetry.io/otel/exporters/otlp/otlpmetric in go.opentelemetry.io/otel/exporters/otlp/otlpmetric
                     v0.27.0
                   → go: found go.opentelemetry.io/otel/exporters/otlp/otlpmetric/otlpmetricgrpc in
                     go.opentelemetry.io/otel/exporters/otlp/otlpmetric/otlpmetricgrpc v0.27.0
petstore-service   → go: found go.opentelemetry.io/otel/metric/global in go.opentelemetry.io/otel/metric v0.27.0
petstore-service   → go: found go.opentelemetry.io/otel/sdk/metric/controller/basic in go.opentelemetry.io/otel/sdk/metric v0.27.0
petstore-service   → go: found go.opentelemetry.io/otel/sdk/metric/processor/basic in go.opentelemetry.io/otel/sdk/metric v0.27.0
petstore-service   → go: found go.opentelemetry.io/otel/sdk/metric/selector/simple in go.opentelemetry.io/otel/sdk/metric v0.27.0
petstore-service   → go: found go.opentelemetry.io/otel/exporters/otlp/otlptrace in go.opentelemetry.io/otel/exporters/otlp/otlptrace v1.4.1
petstore-service   → go: found go.opentelemetry.io/otel/exporters/otlp/otlptrace/otlptracegrpc in
                     go.opentelemetry.io/otel/exporters/otlp/otlptrace/otlptracegrpc v1.4.1
petstore-service   → go: found go.opentelemetry.io/otel/exporters/stdout/stdouttrace in go.opentelemetry.io/otel/exporters/stdout/stdouttrace
                     v1.4.1
petstore-service   → go: found go.opentelemetry.io/otel/propagation in go.opentelemetry.io/otel v1.4.1
petstore-service   → go: found go.opentelemetry.io/otel/sdk/resource in go.opentelemetry.io/otel/sdk v1.4.1
petstore-service   → go: found go.opentelemetry.io/otel/semconv/v1.4.0 in go.opentelemetry.io/otel v1.4.1
petstore-service   → go: found google.golang.org/protobuf/reflect/protoreflect in google.golang.org/protobuf v1.27.1
petstore-service   → go: found google.golang.org/protobuf/runtime/protoimpl in google.golang.org/protobuf v1.27.1
petstore-service   → go: found github.com/kylelemons/godebug/pretty in github.com/kylelemons/godebug v1.1.0
petstore-operator-...  [builder  6/10] COPY main.go main.go [done: 785ms]
petstore-operator-...  [builder  7/10] COPY api/ api/ [done: 729ms]
petstore-operator-...  [builder  8/10] COPY controllers/ controllers/ [done: 1.022s]
petstore-operator-...  [builder  9/10] COPY client/ client/ [done: 703ms]
petstore-operator-...  [builder 10/10] RUN CGO_ENABLED=0 GOOS=linux GOARCH=amd64 go build -a -o manager main.go [done: 23.87s]
petstore-service   → go: downloading github.com/google/go-cmp v0.5.7
petstore-service   → go: downloading github.com/stretchr/testify v1.7.0
petstore-service   → go: downloading github.com/go-logr/logr v1.2.2
petstore-service   → go: downloading golang.org/x/net v0.0.0-20210405180319-a5a99cb37ef4
petstore-service   → go: downloading github.com/golang/protobuf v1.5.2
petstore-service   → go: downloading gopkg.in/check.v1 v1.0.0-20190902080502-41f04d3bba15
petstore-service   → go: downloading github.com/go-logr/stdr v1.2.2
petstore-service   → go: downloading go.opentelemetry.io/proto/otlp v0.12.0
petstore-service   → go: downloading go.opentelemetry.io/otel/internal/metric v0.27.0
petstore-service   → go: downloading go.opentelemetry.io/otel/exporters/otlp/internal/retry v1.4.1
petstore-service   → go: downloading go.uber.org/goleak v1.1.12
petstore-service   → go: downloading golang.org/x/sys v0.0.0-20210510120138-977fb7262007
petstore-service   → go: downloading github.com/davecgh/go-spew v1.1.0
petstore-service   → go: downloading github.com/pmezard/go-difflib v1.0.0
```
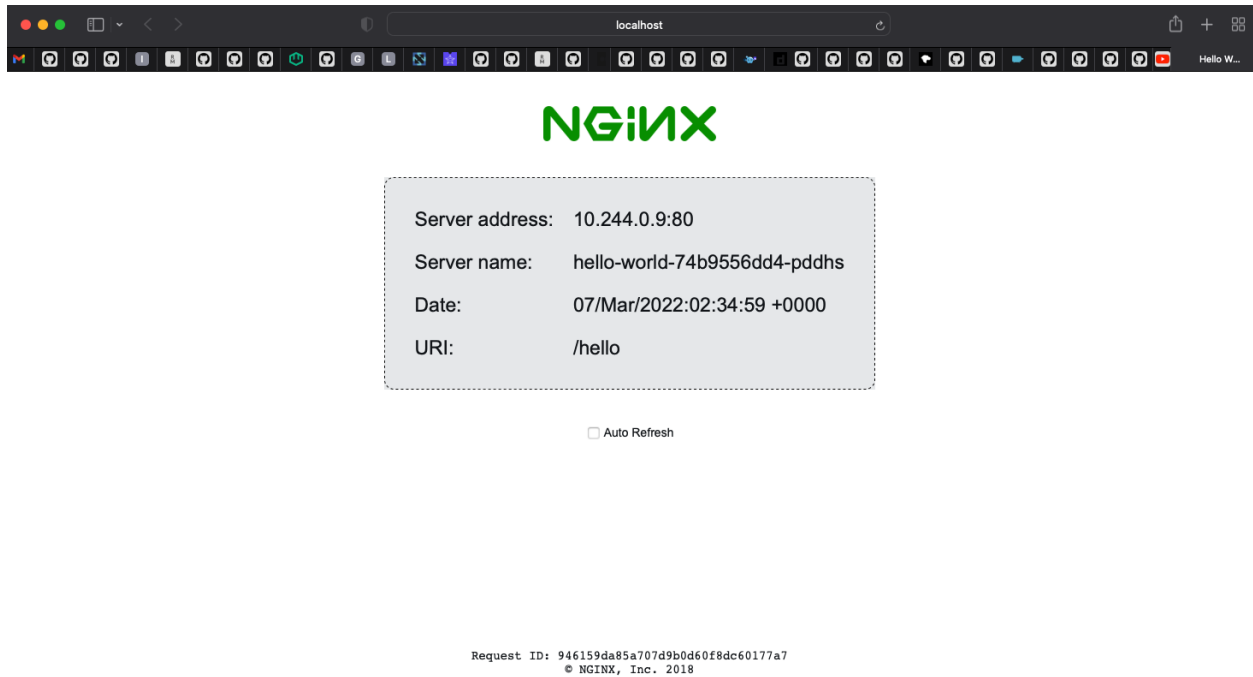
Chapter 15: Programming the Cloud

Chapter 16: Designing for Chaos