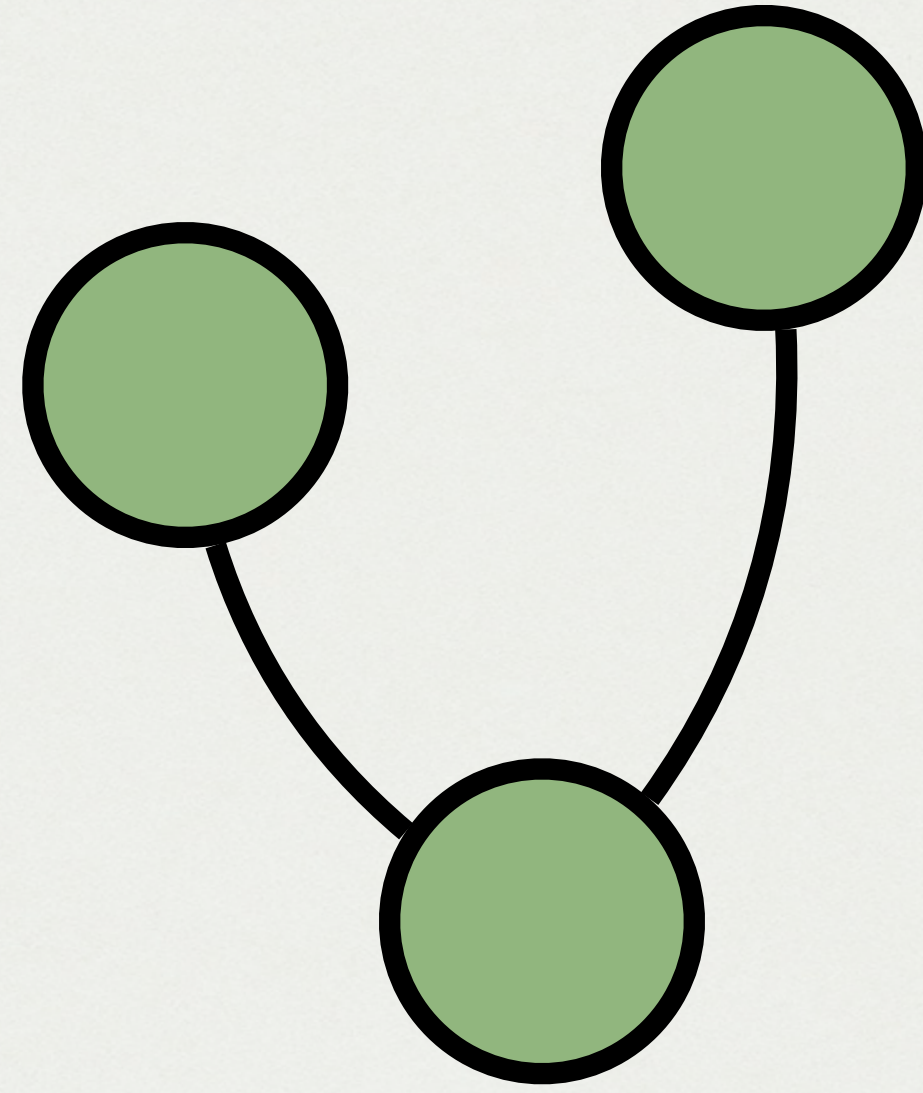


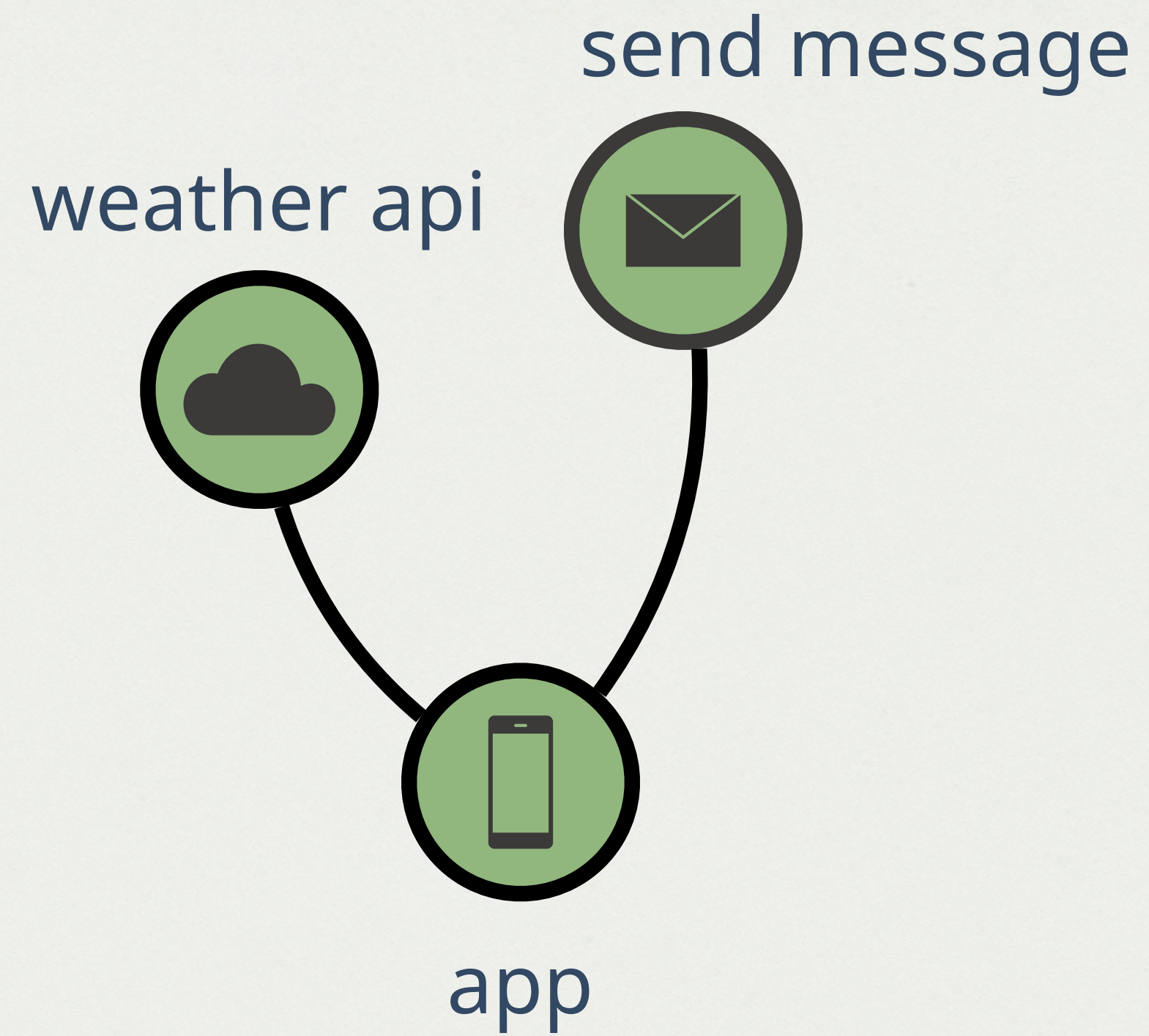
Nerves Project

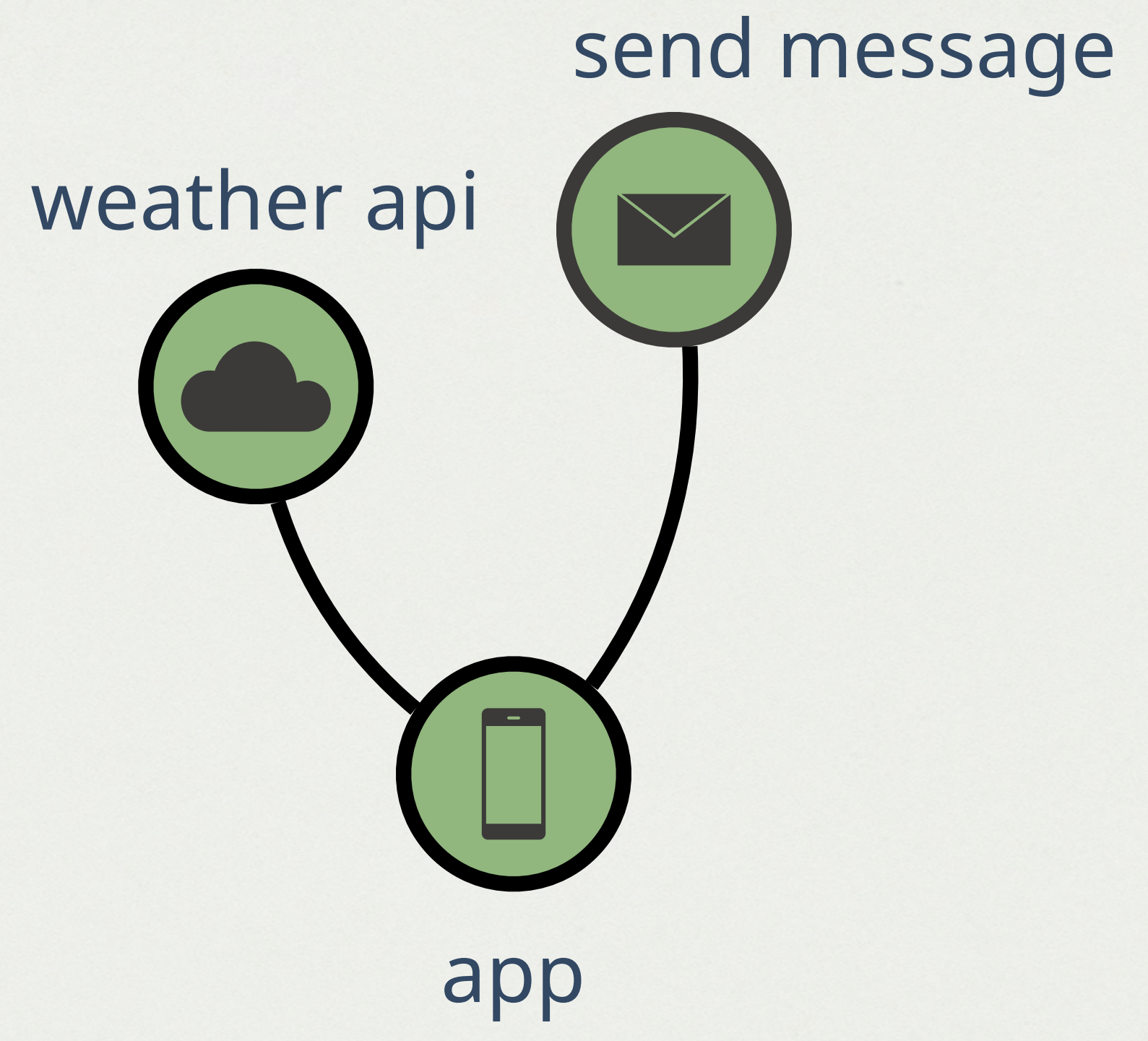
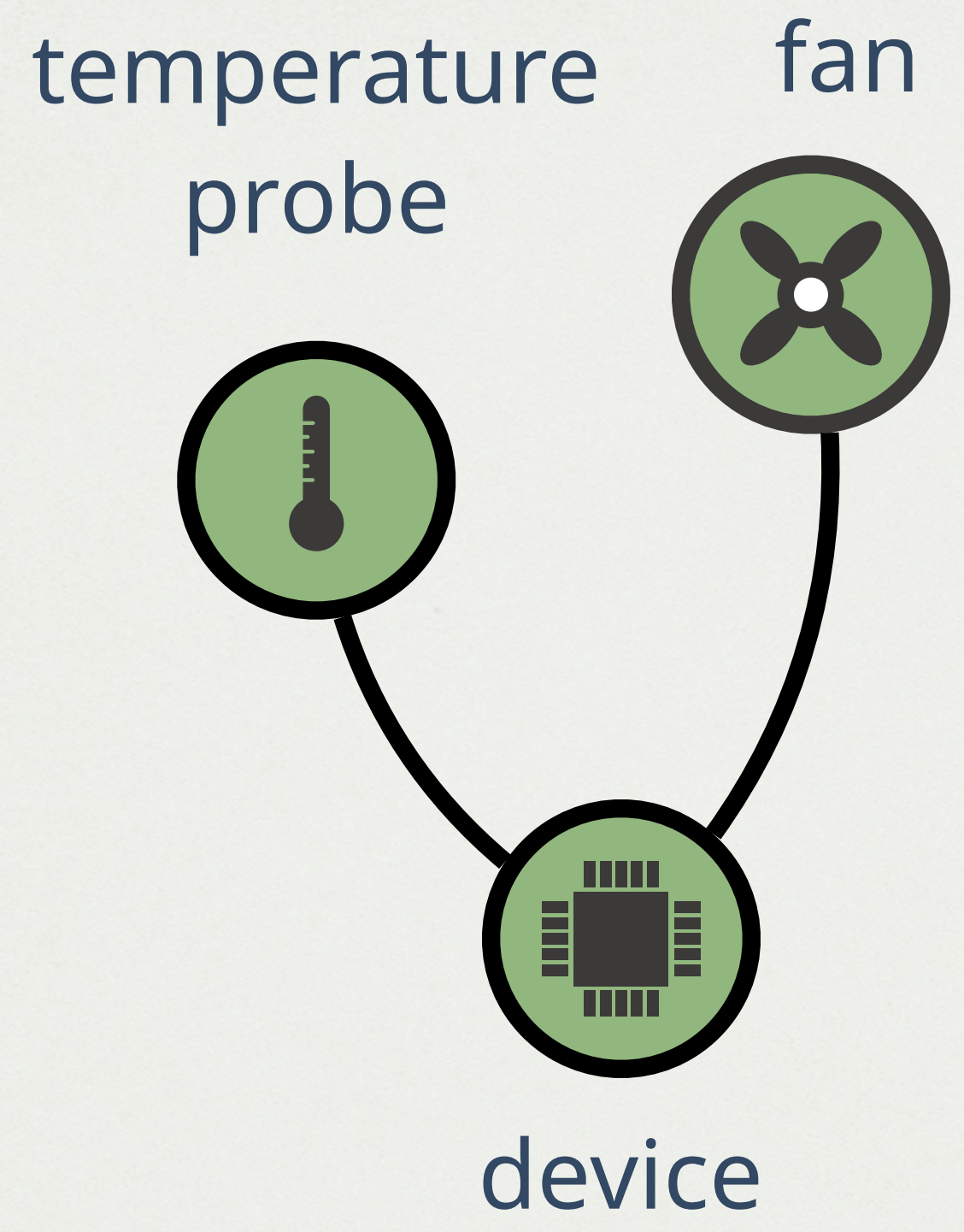
Performant, Scalable, and Fault Tolerant Embedded Systems.

Product Modeling



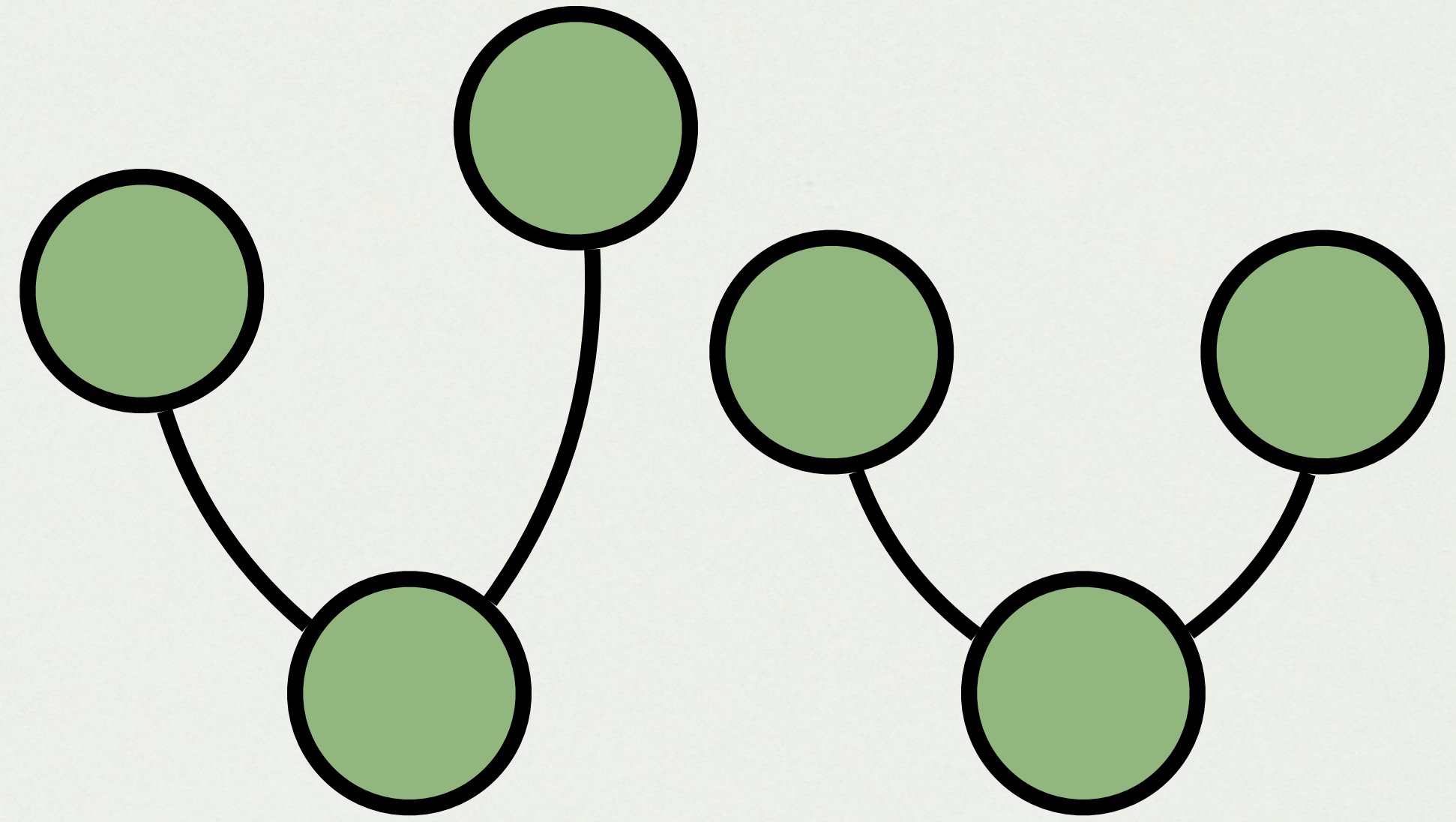
Product Modeling





**Embedded and Web programming
share the same problems**

Product Modeling

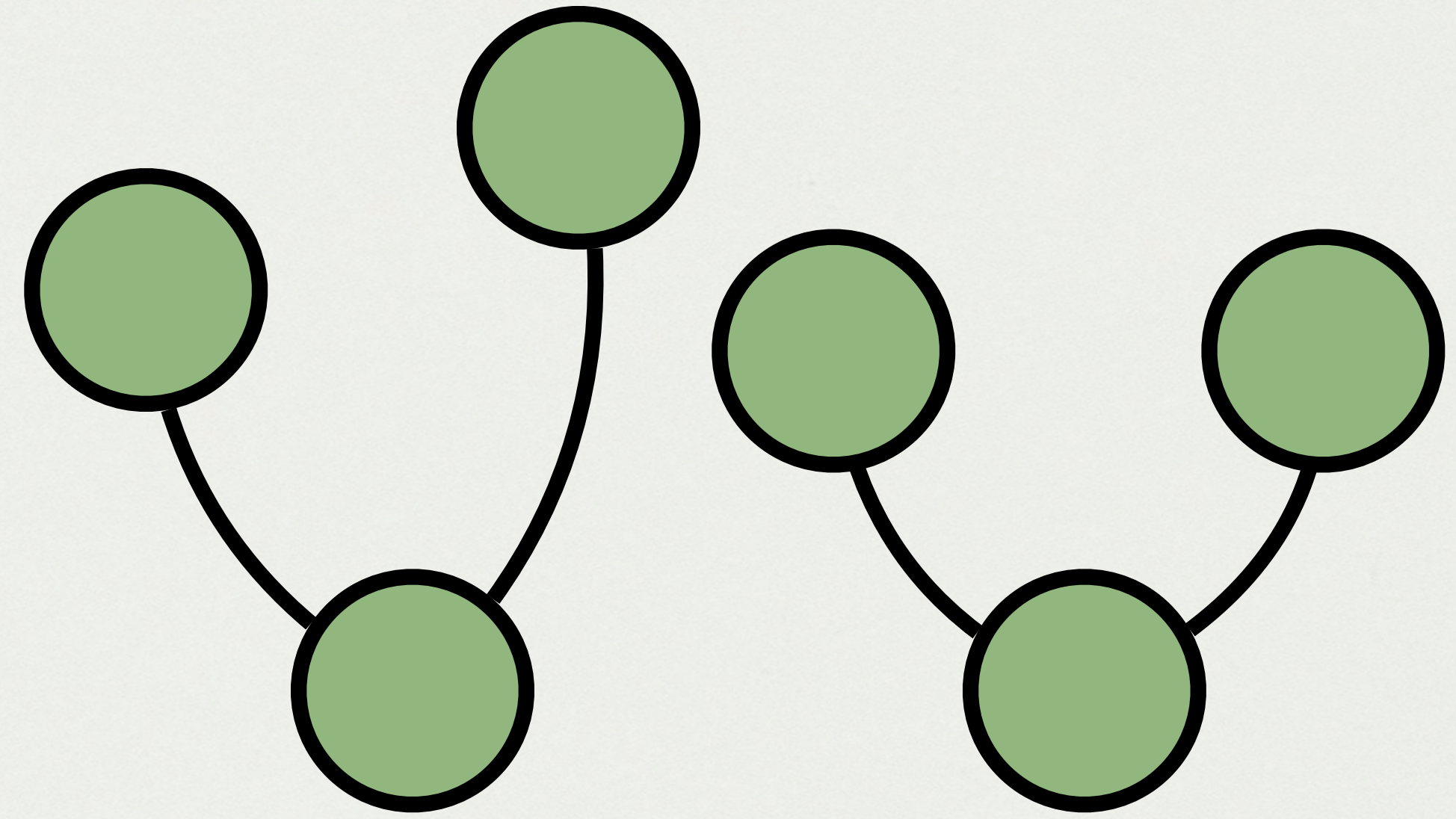


Resilient

弾力性のある？

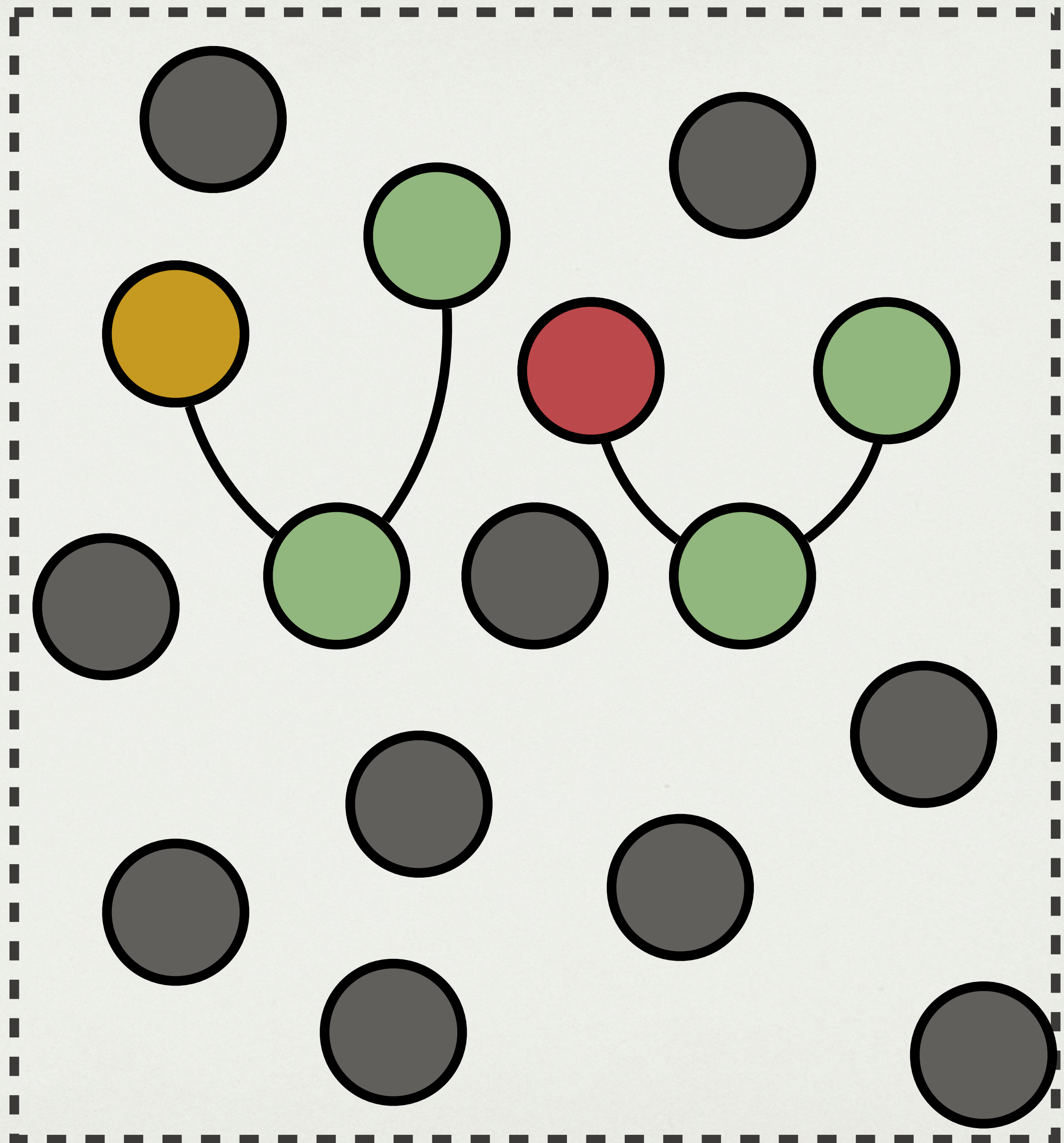
ではなく

レジリエント

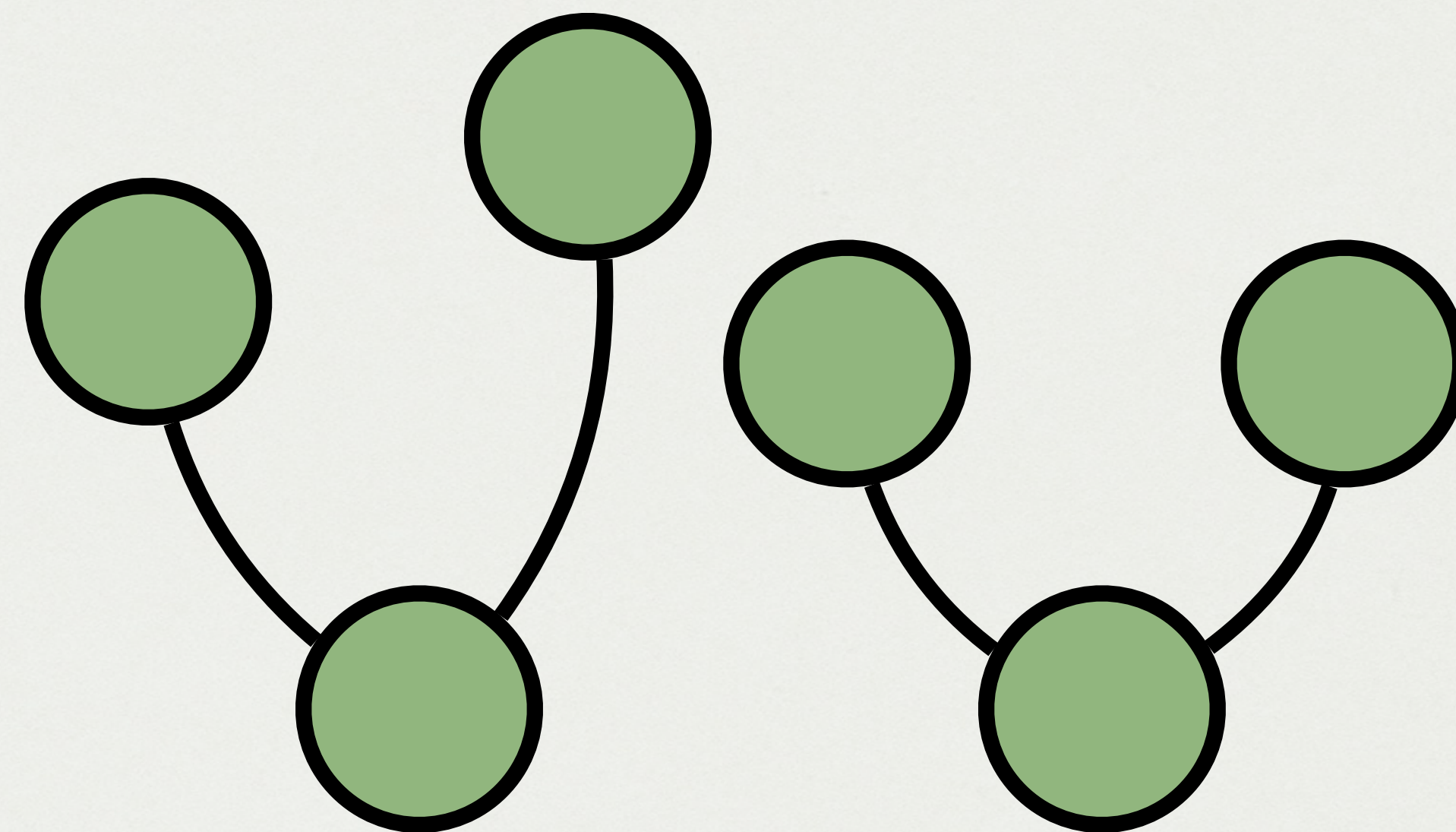


Reproducible

高い再生産性

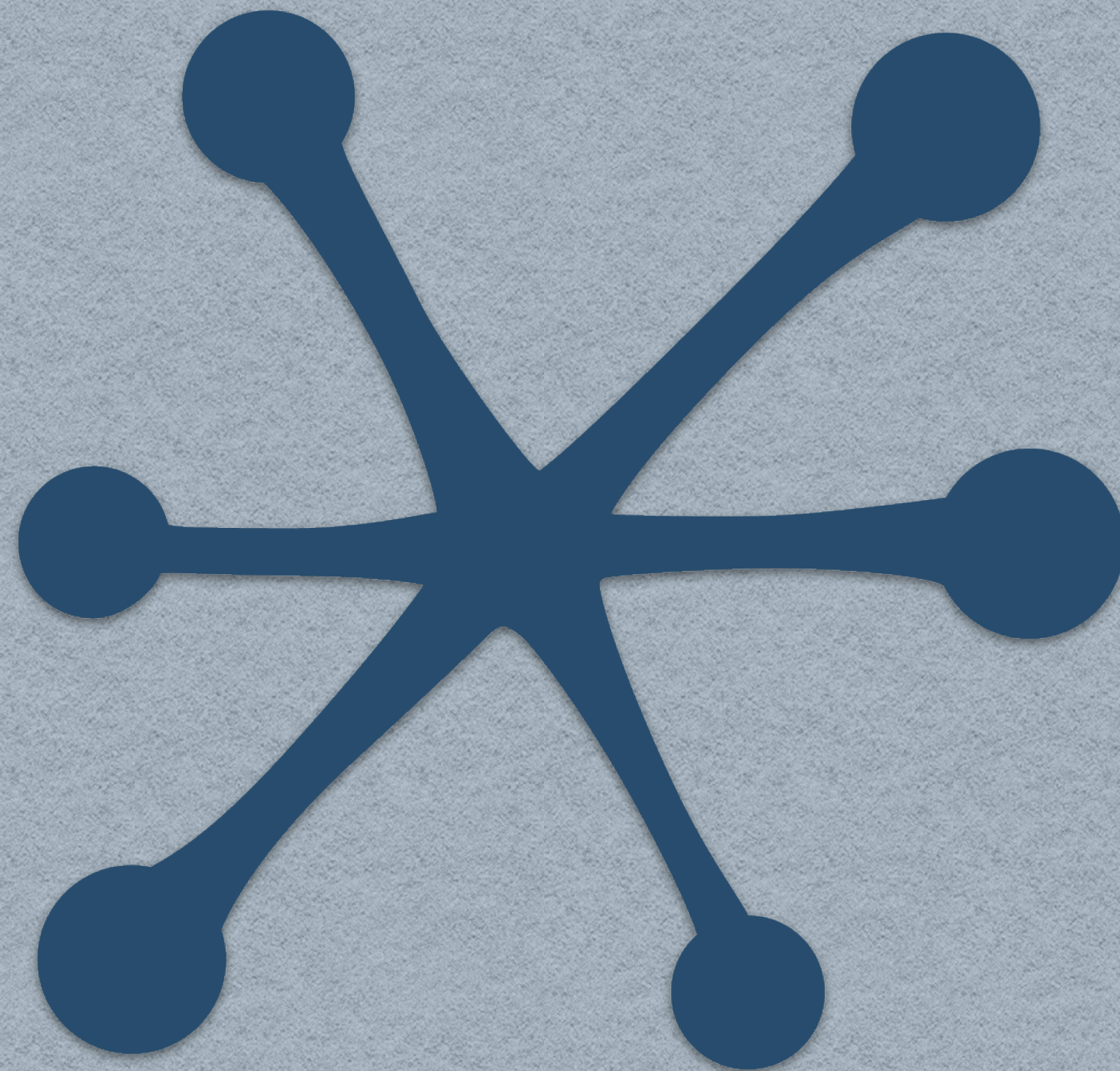


Reasonable
リーズナブル



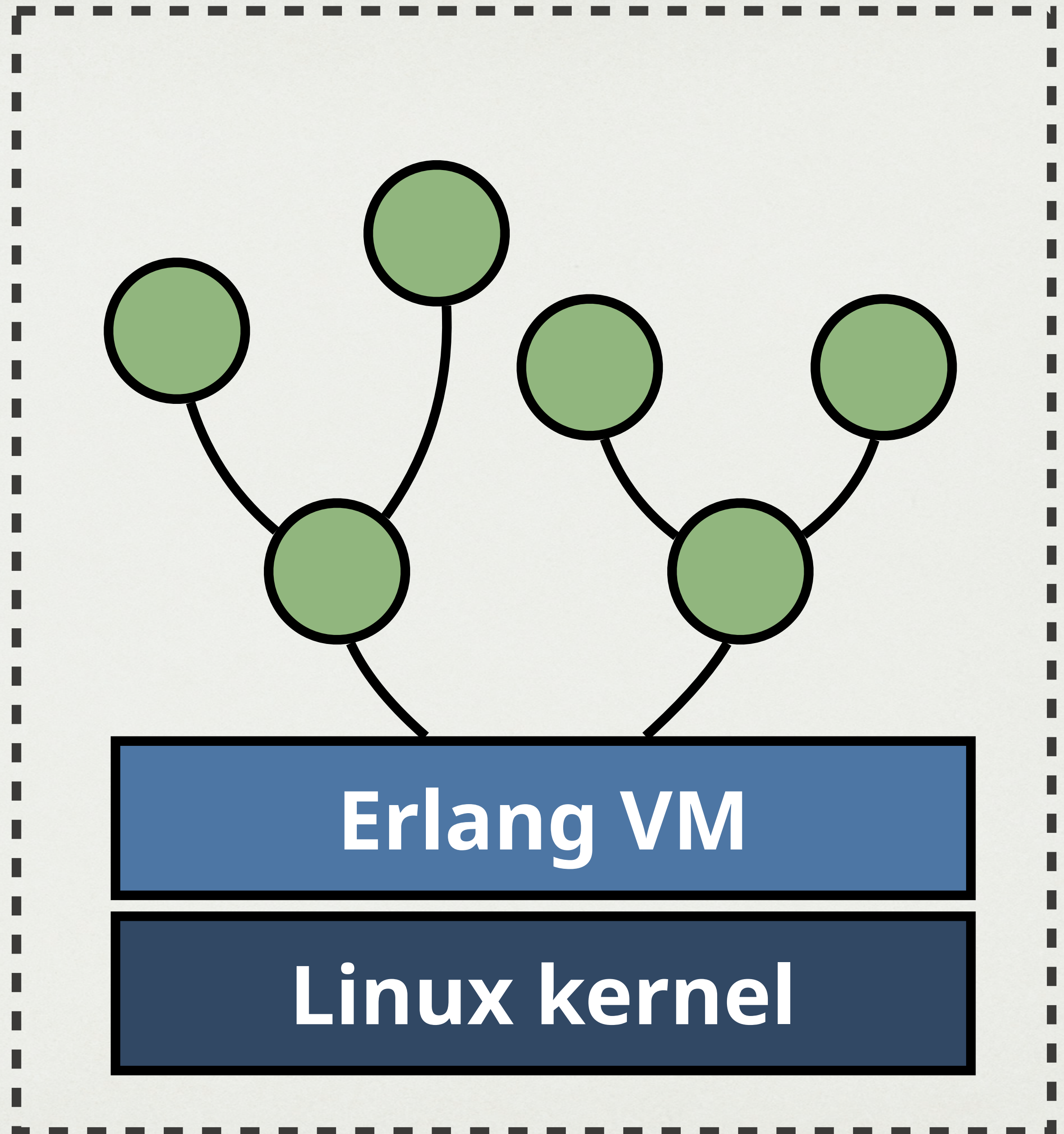
Ubuntu

How do we build
maintainable
embedded systems?

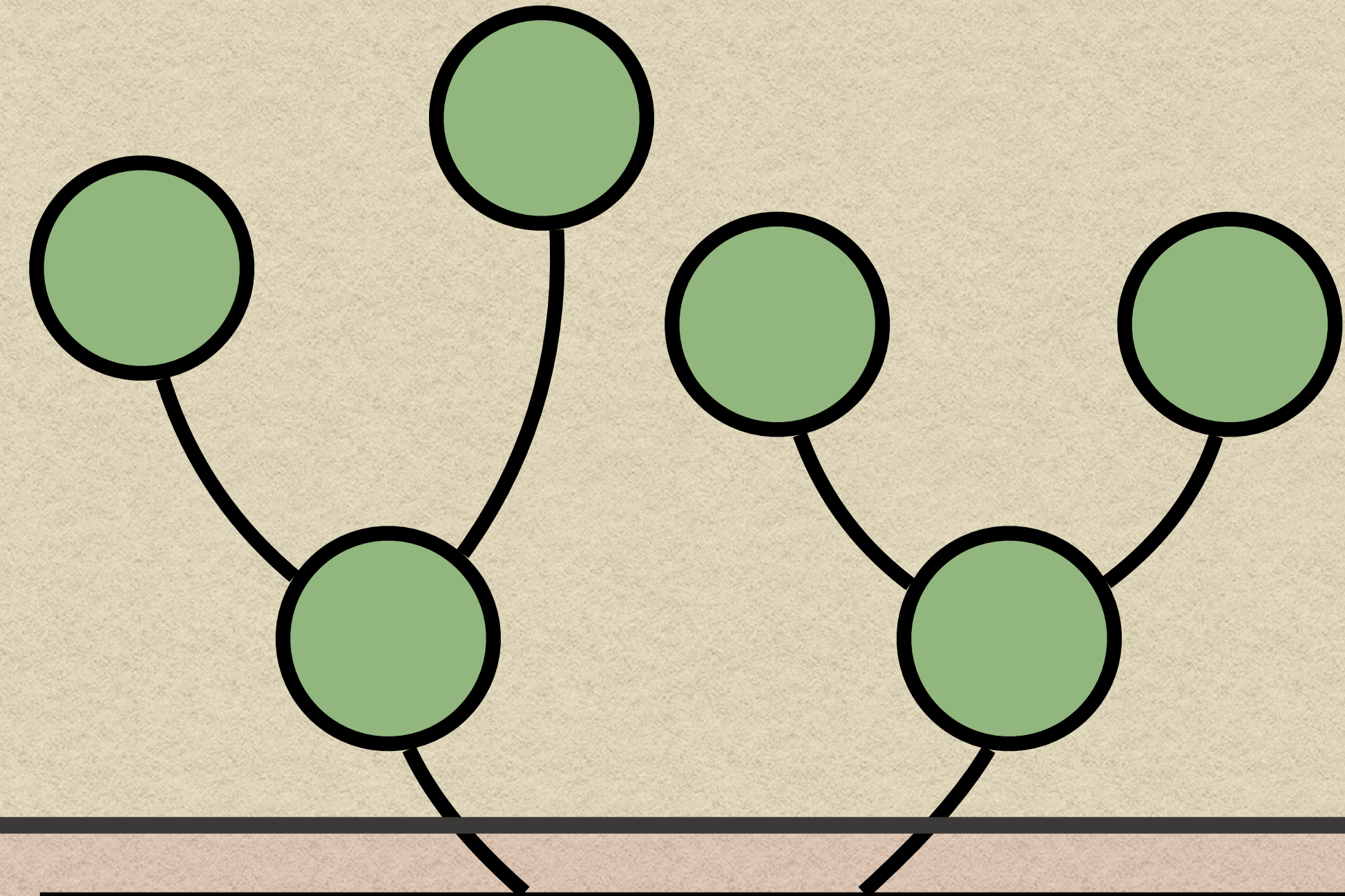
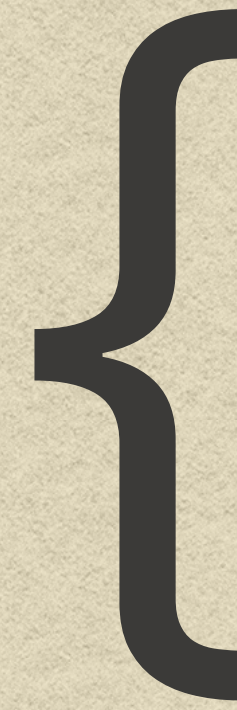


Nerves Project

Nerves Runtime

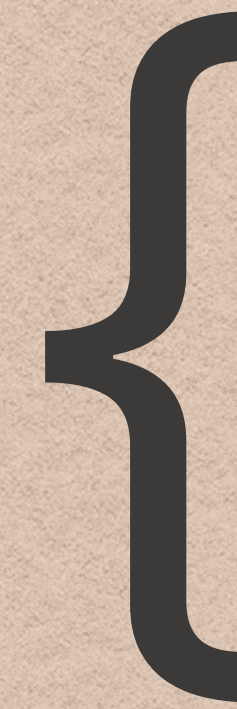


**Application
Logic**



Nerves runtime

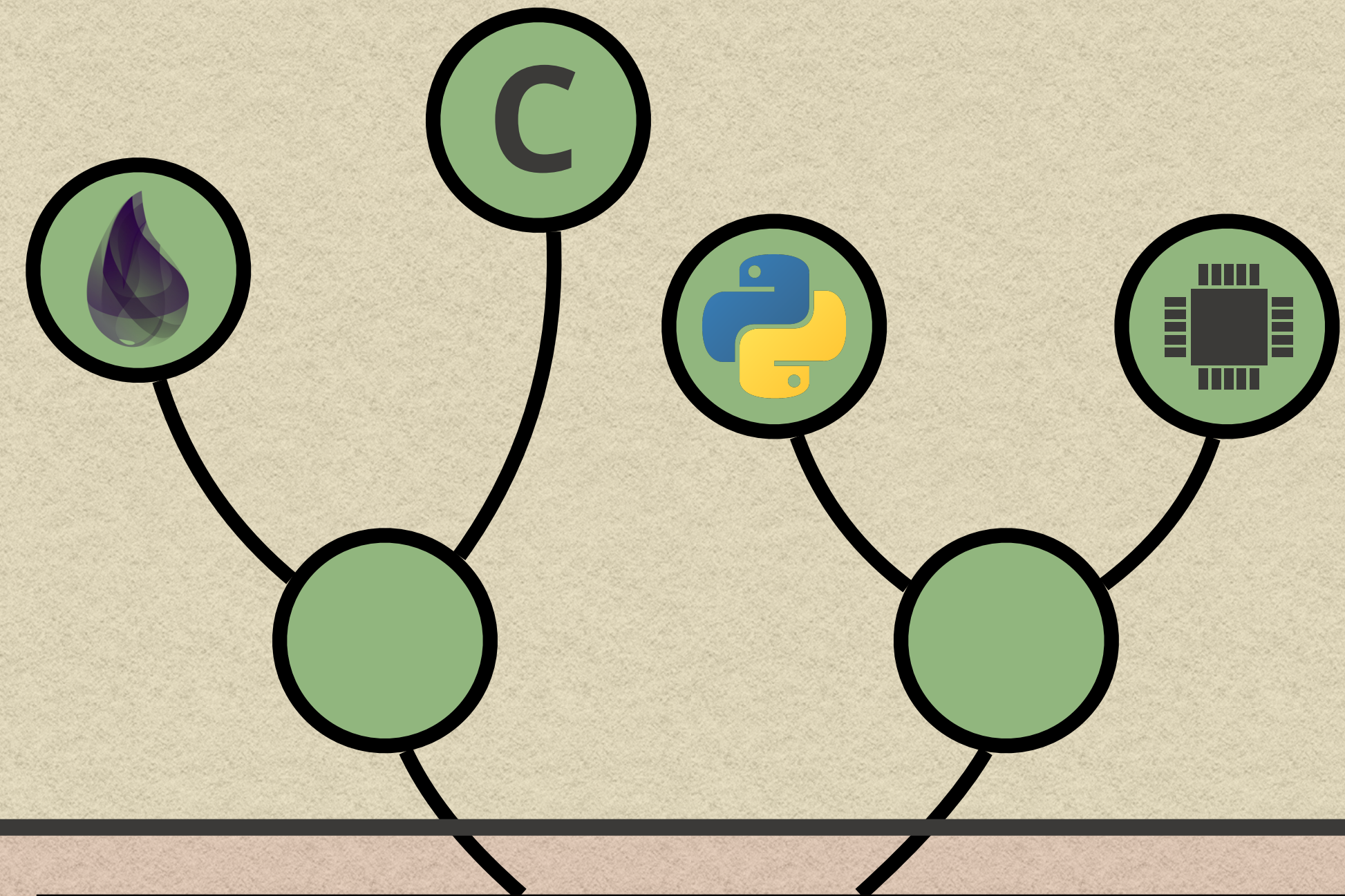
**Operating
System**



Erlang VM

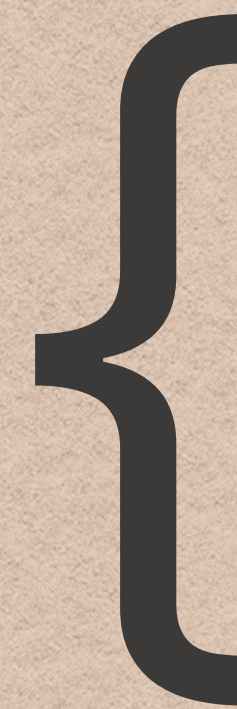
Linux kernel

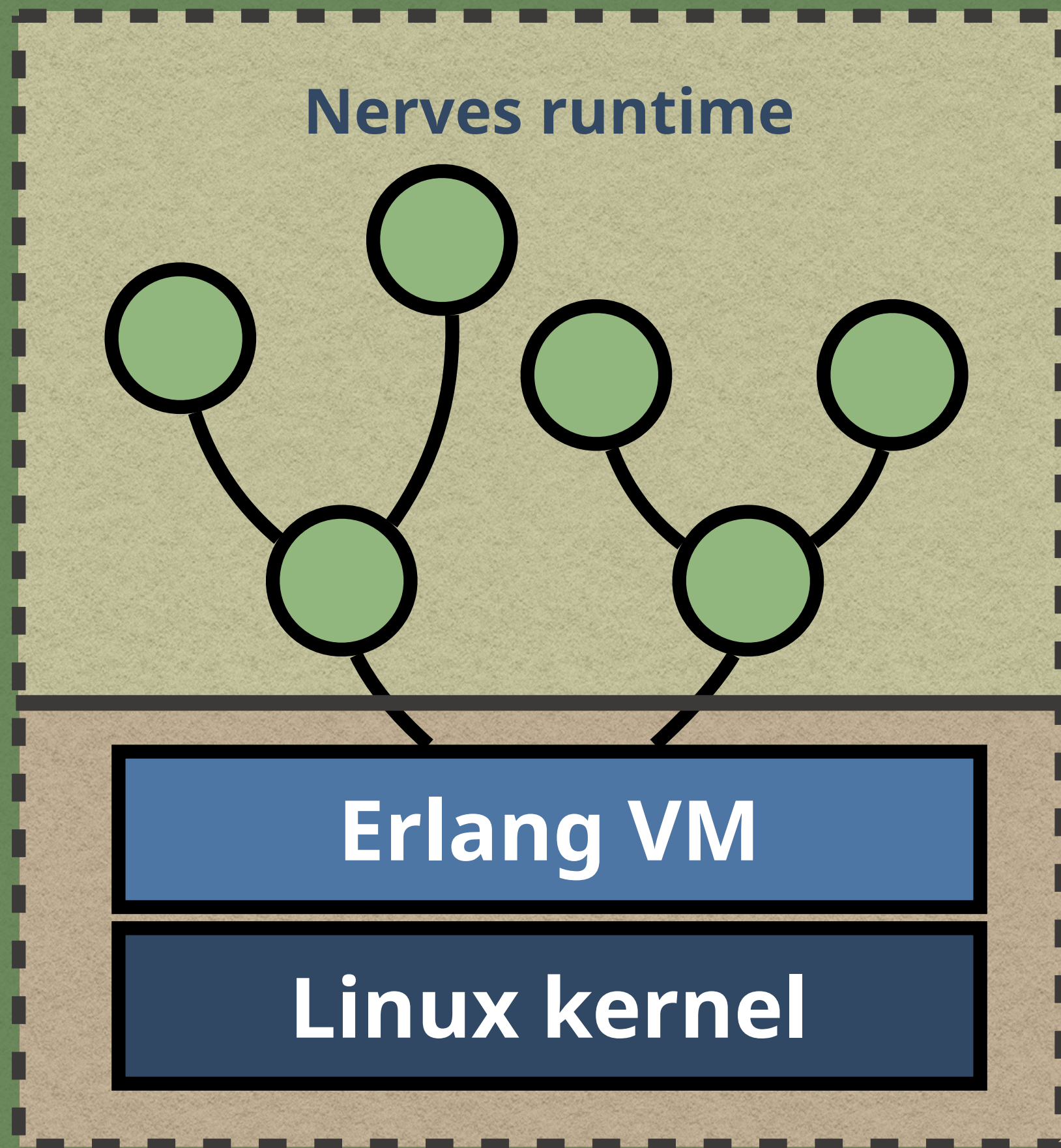
**Application
Logic**



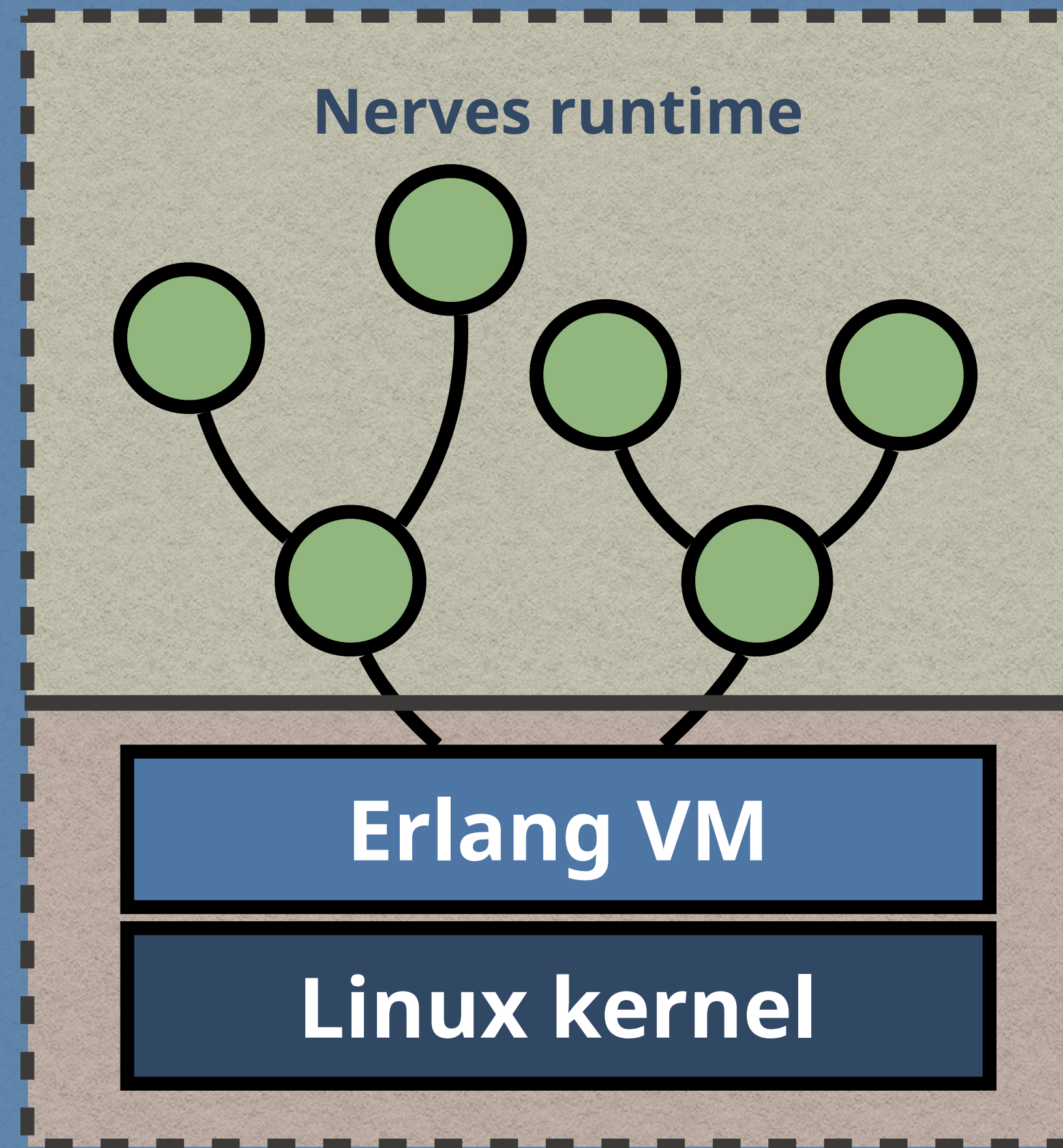
Nerves runtime

**Operating
System**

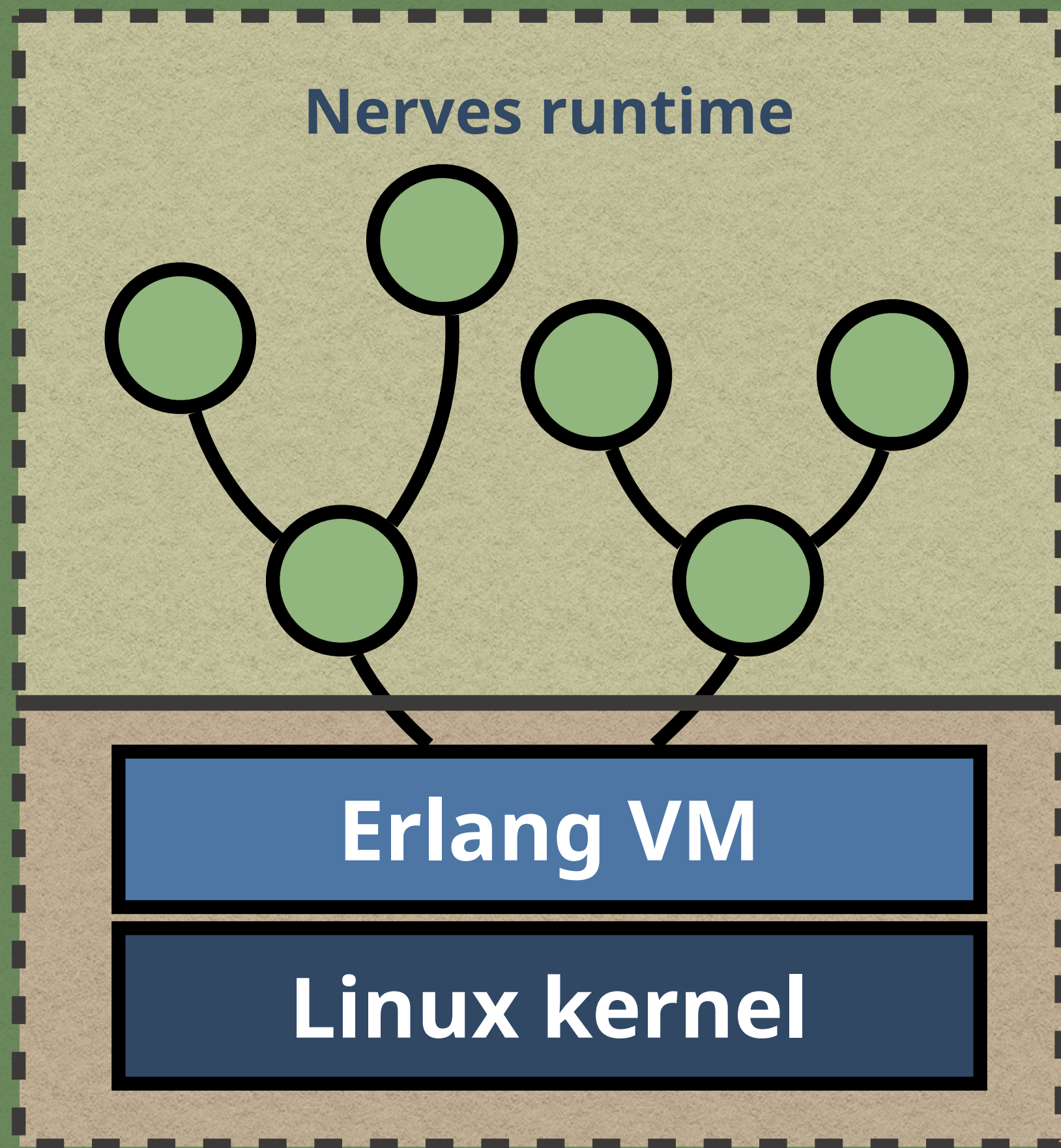




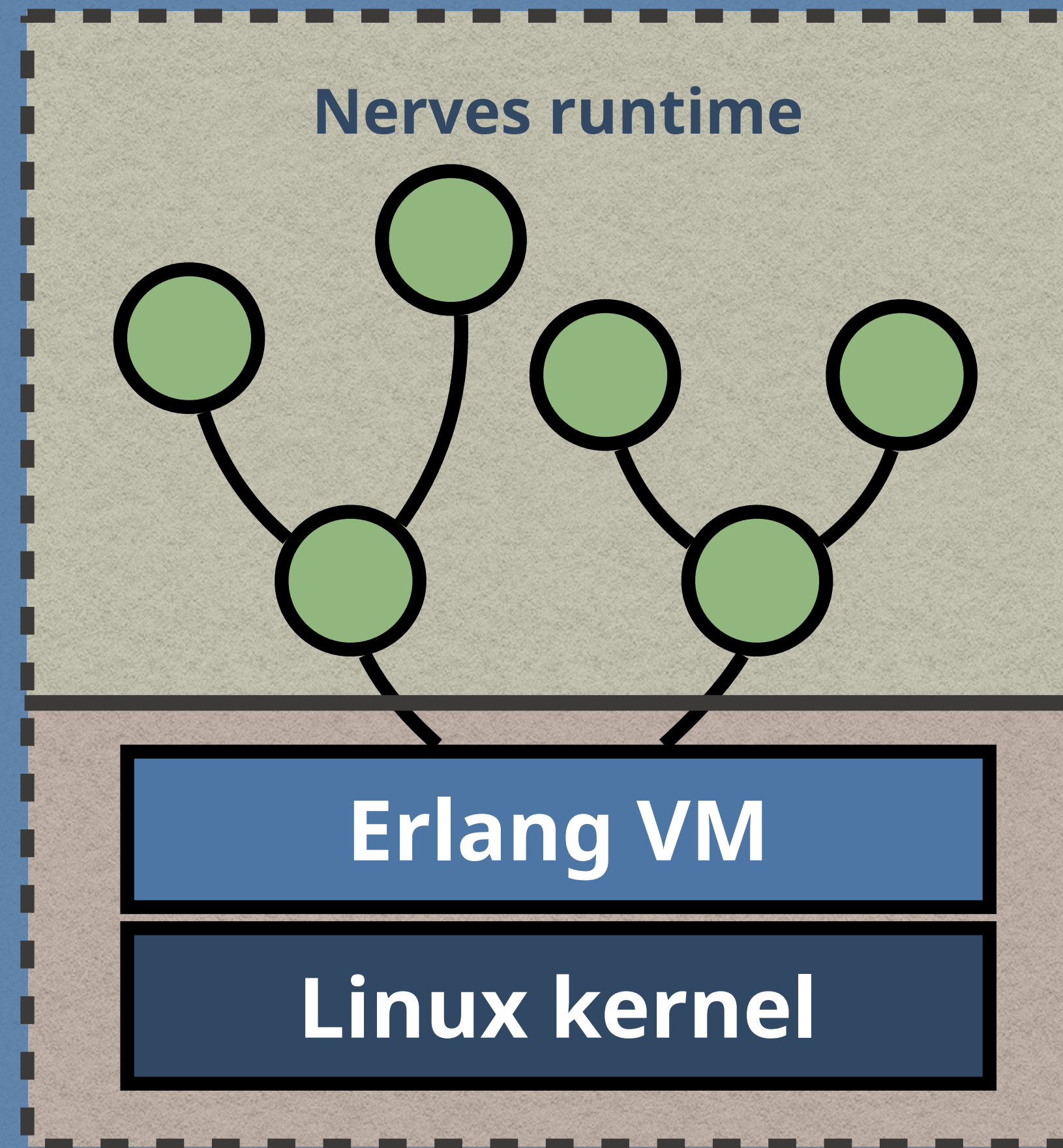
A



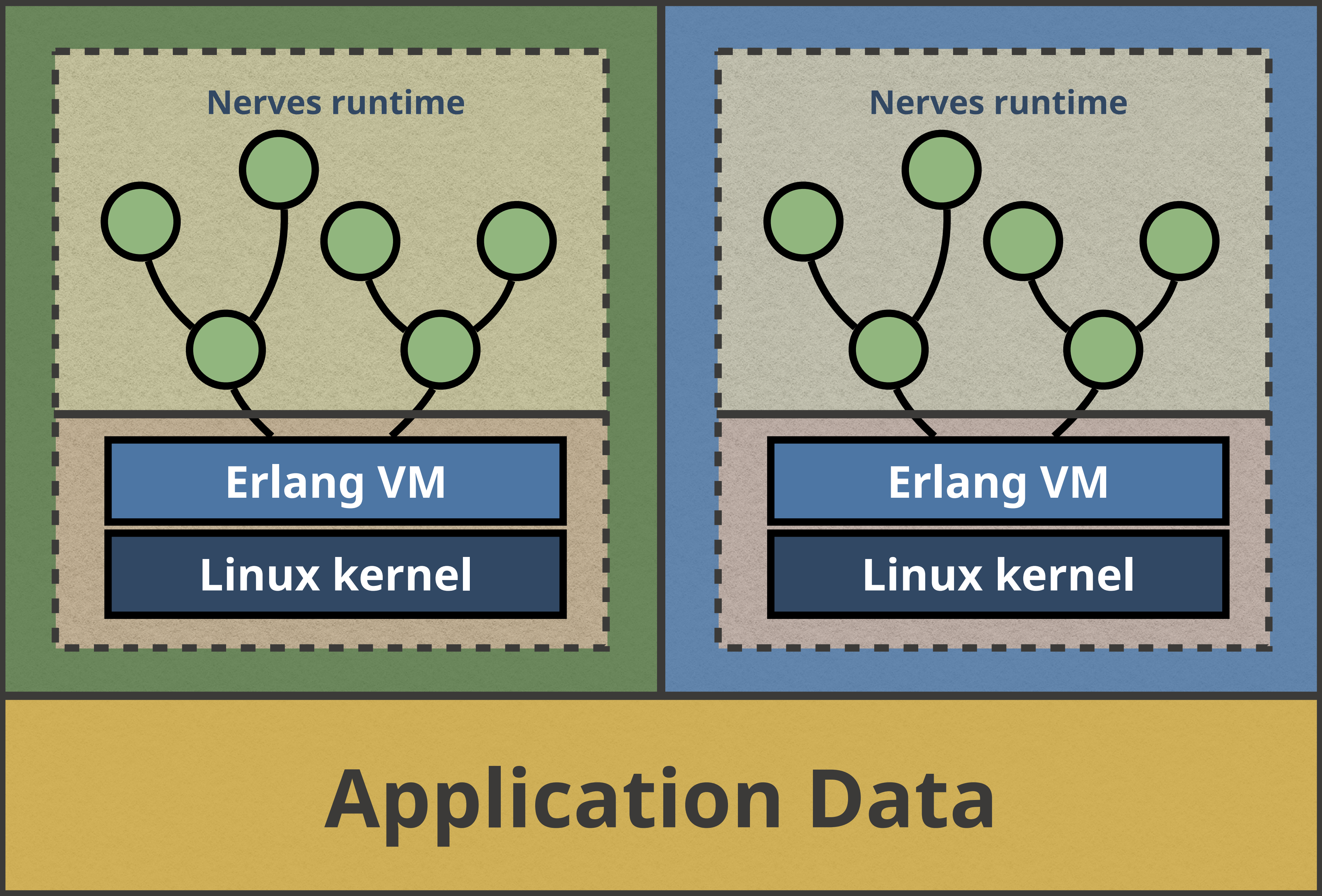
B

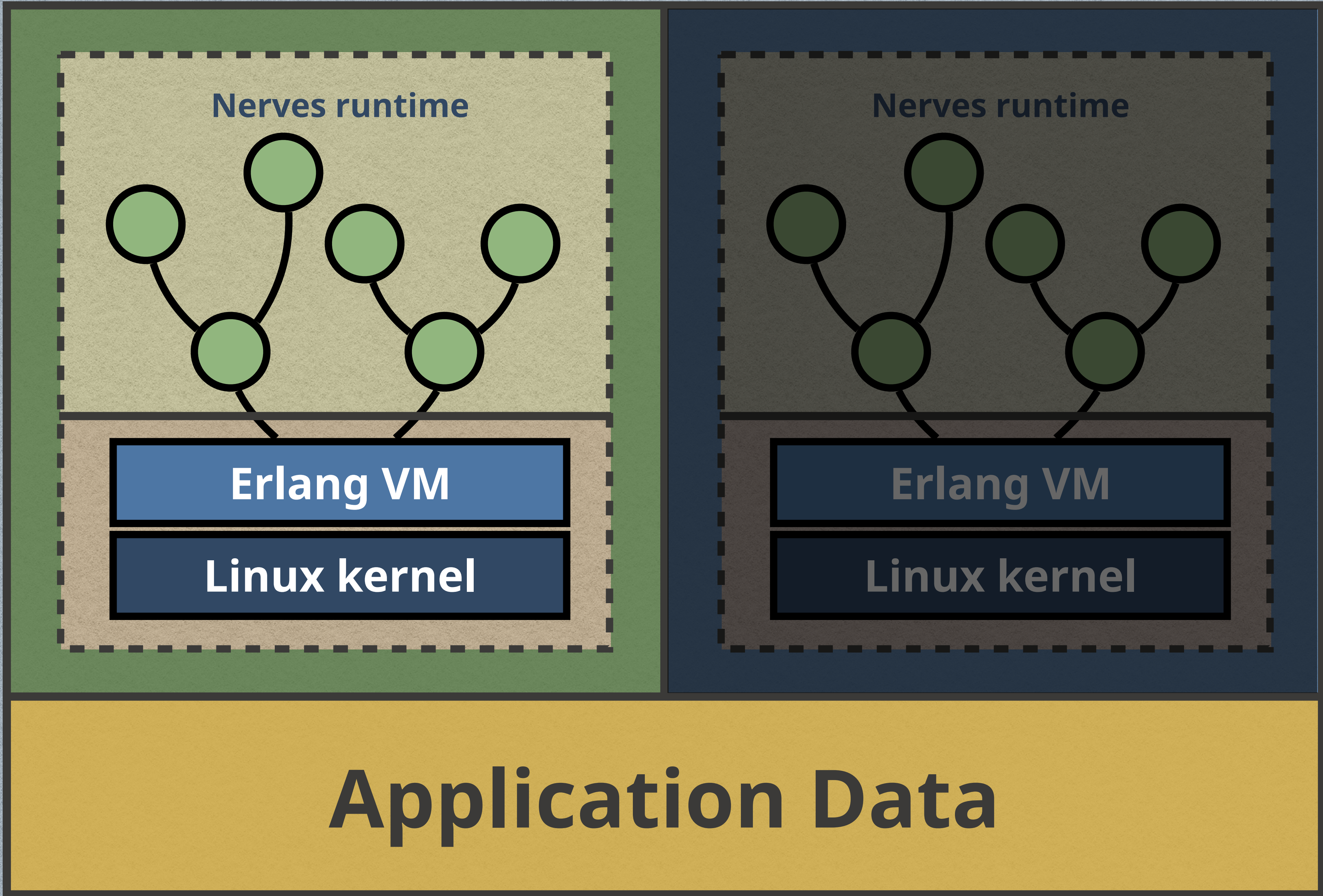


A

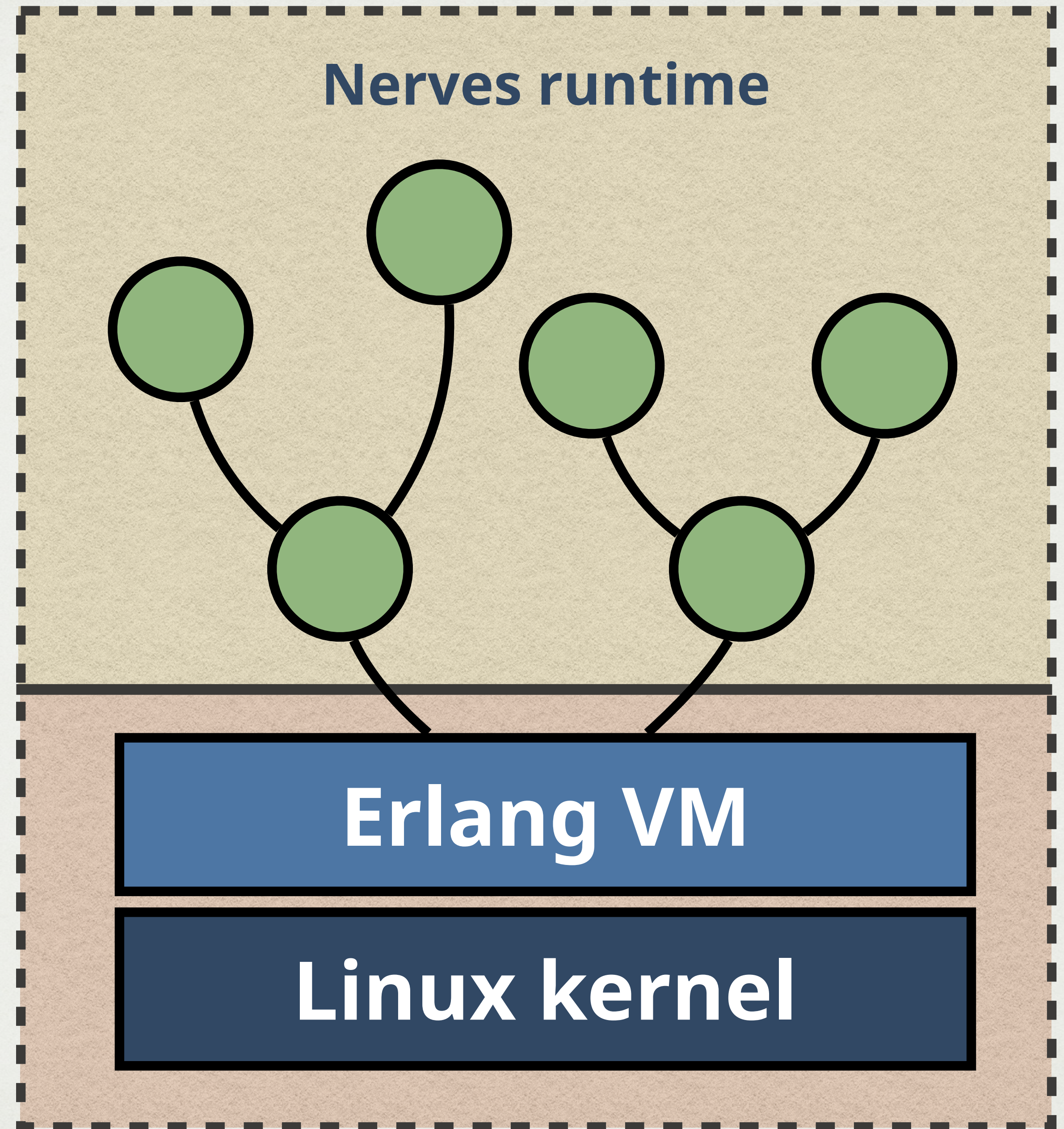


B

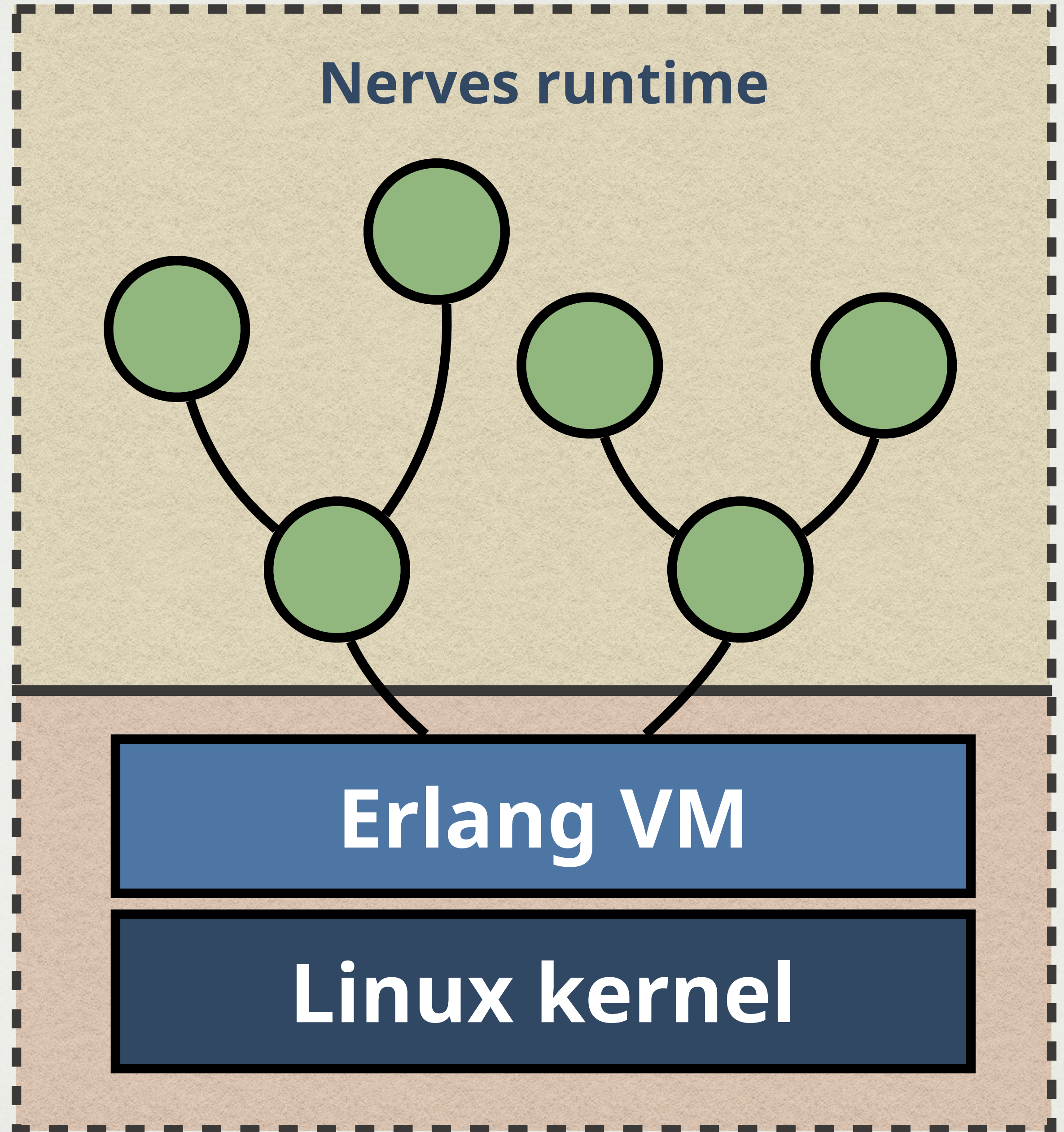




Resilient レジリエント



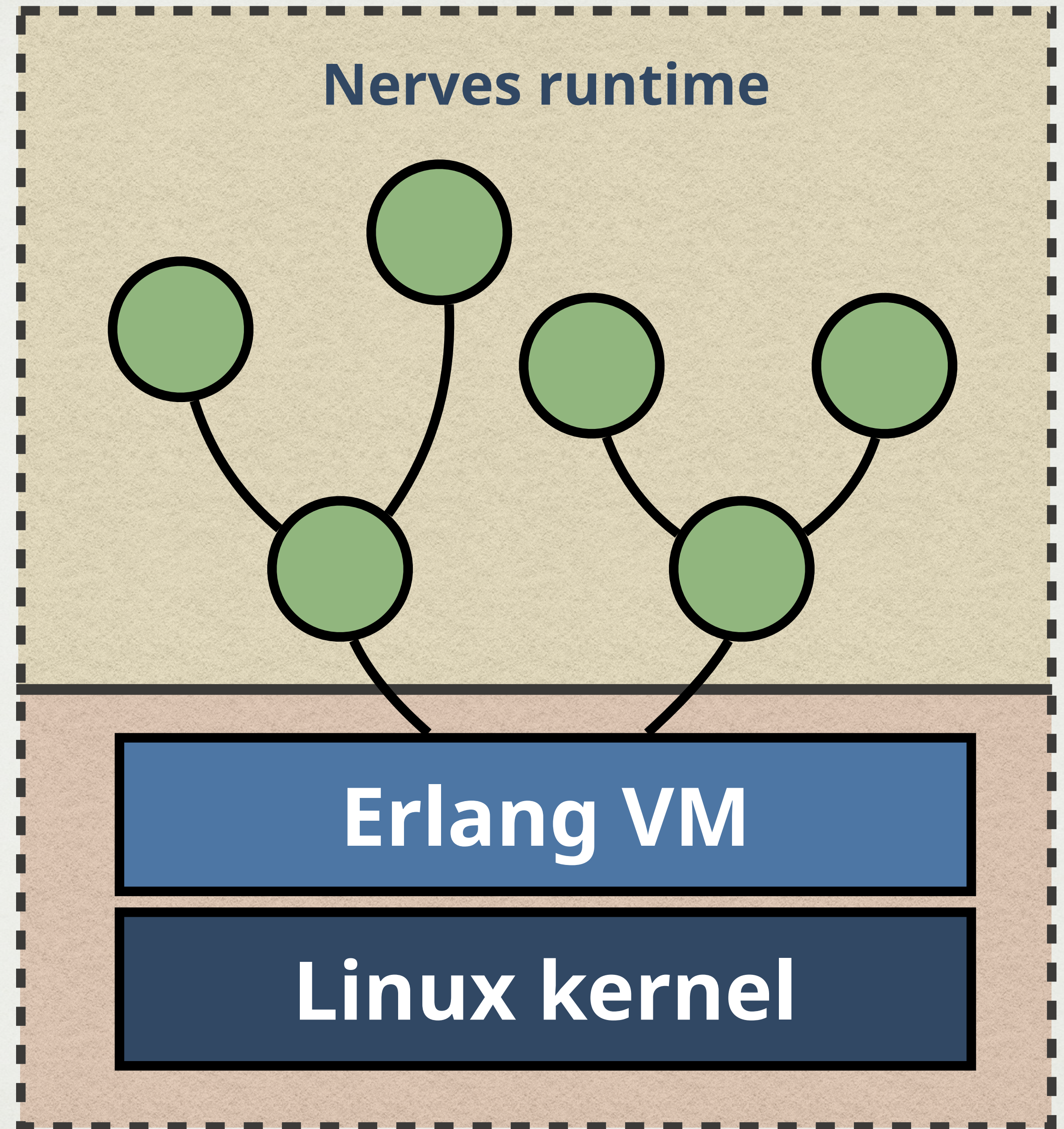
Resilient レジリエント



Reproducible

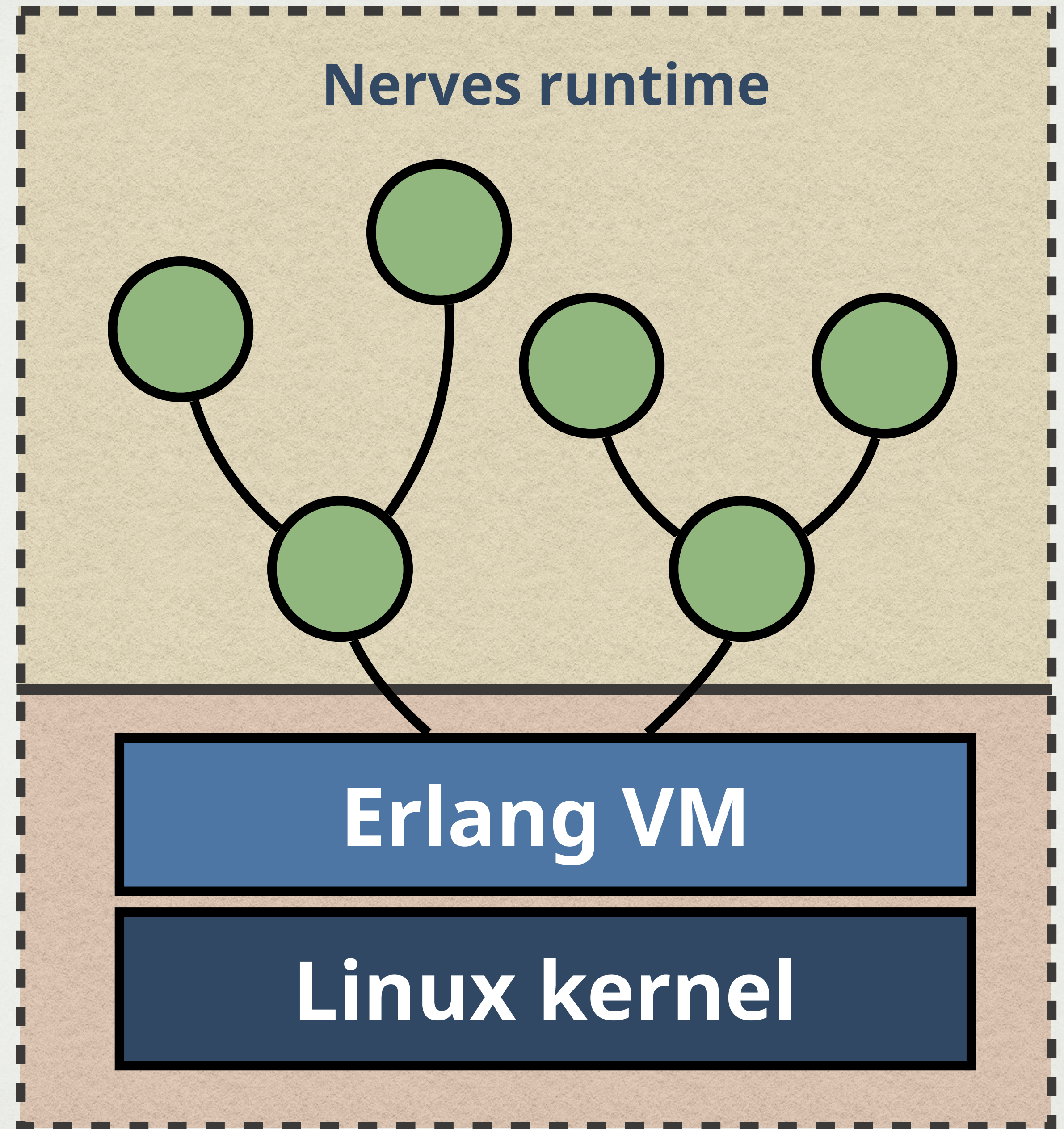
高い再生産性

- Read only root filesystem
- Immutable
- Working towards reproducible builds (tedious)



Reasonable リーズナブル

- Whitelist approach (build up)
- Minimal output



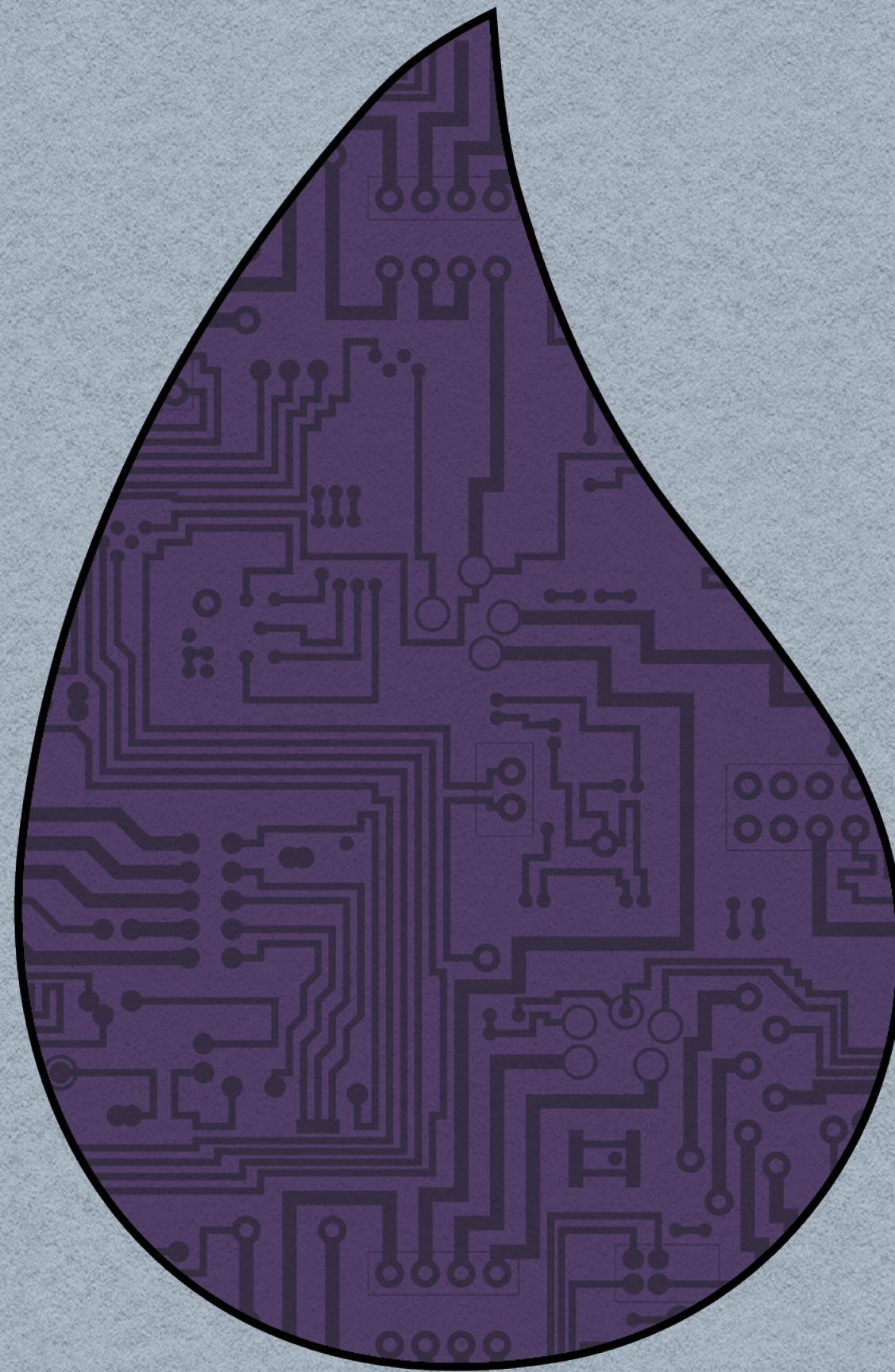
Nerves is a foundation for building
resilient embedded systems.

**Nerves can run on any
hardware that supports
embedded Linux**

Getting Started

Documentation: hexdocs.pm/nerves

Demo



Elixir Circuits

Elixir Circuits

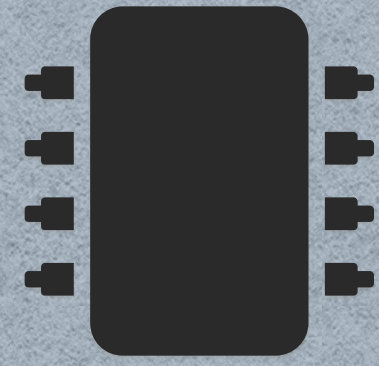


GPIO

Buttons

Switches

Lights



I2C

accelerometers

gyroscopes

compasses



SPI

analog to digital

small displays



UART

GPS Receivers

Cellular modems

github.com/eixir-circuits/circuits_quickstart

The screenshot shows a web browser window displaying the GitHub repository page for `elixir-circuits/circuits_quickstart`. The browser's address bar shows the URL `github.com/elixir-circuits/circuits_quickstart`. The GitHub navigation bar includes a search bar, links for Pull requests, Issues, Marketplace, and Explore, and a user profile icon. The repository header shows the name `elixir-circuits / circuits_quickstart`, along with buttons for Watch (5), Star (20), and Fork (4). Below the header is a navigation menu with options: Code, Issues (0), Pull requests (0), Projects (0), Wiki, Security, Insights, and Settings. The main content area features a call to action "Try out Elixir Circuits!" with an "Edit" button. Below this is a "Manage topics" link and a summary bar showing 28 commits, 1 branch, 2 releases, and 4 contributors. A secondary navigation bar includes a branch selector (set to "master"), a "New pull request" button, and buttons for "Create new file", "Upload files", "Find File", and "Clone or download". The repository's commit history is displayed as a table with columns for the commit author, description, and time since the commit.

elixir-circuits / circuits_quickstart

Watch 5 Star 20 Fork 4

Code Issues 0 Pull requests 0 Projects 0 Wiki Security Insights Settings

Try out Elixir Circuits! Edit

Manage topics

28 commits 1 branch 2 releases 4 contributors

Branch: master New pull request Create new file Upload files Find File Clone or download

Author	Description	Time
fhunleth	v0.2.0 release	Latest commit f73ae82 6 days ago
	.circleci	Add rpi4 and update systems last month
	assets	Add etcher screenshot 3 months ago
	config	Add ranoops_logger and power_control 2 months ago
	lib	Initial commit 4 months ago
	rel	Use Elixir 1.9 releases last month
	rootfs_overlay/etc	Initial commit 4 months ago
	test	Initial commit 4 months ago

ssh circuits@nerves.local

```
ssh circuits@nerves.local (ssh)
SSH server
Enter password for "circuits"
password:
Interactive Elixir (1.9.1) - press Ctrl+C to exit (type h()) ENTER for help)
Toolshed imported. Run h(Toolshed) for more info

      ;kX'
      ,0XXXl
      xNXNNXX.
      'KNNXXXXX0.
      ;XNNNNNNNNN0.
      ;XNNNNNNNNNNX:
      .XNNNNXXXXXXXXXXO.
      kNNNNNNNNXXNNXXNo
      .NNNXNNNNXXNNXXNXO
      cXXXNNNNNNXXNNNNNNNd
      lNNNNNNNNXXNNXXNNNNK
      'NNXNXNNXXXXXXXXNNNNk
      oNXNNXXNNXXNNNNXXX.
      :KXXXXXXXXNNNNXk.
      ;xXNNXXNX0o.
      .',:;,

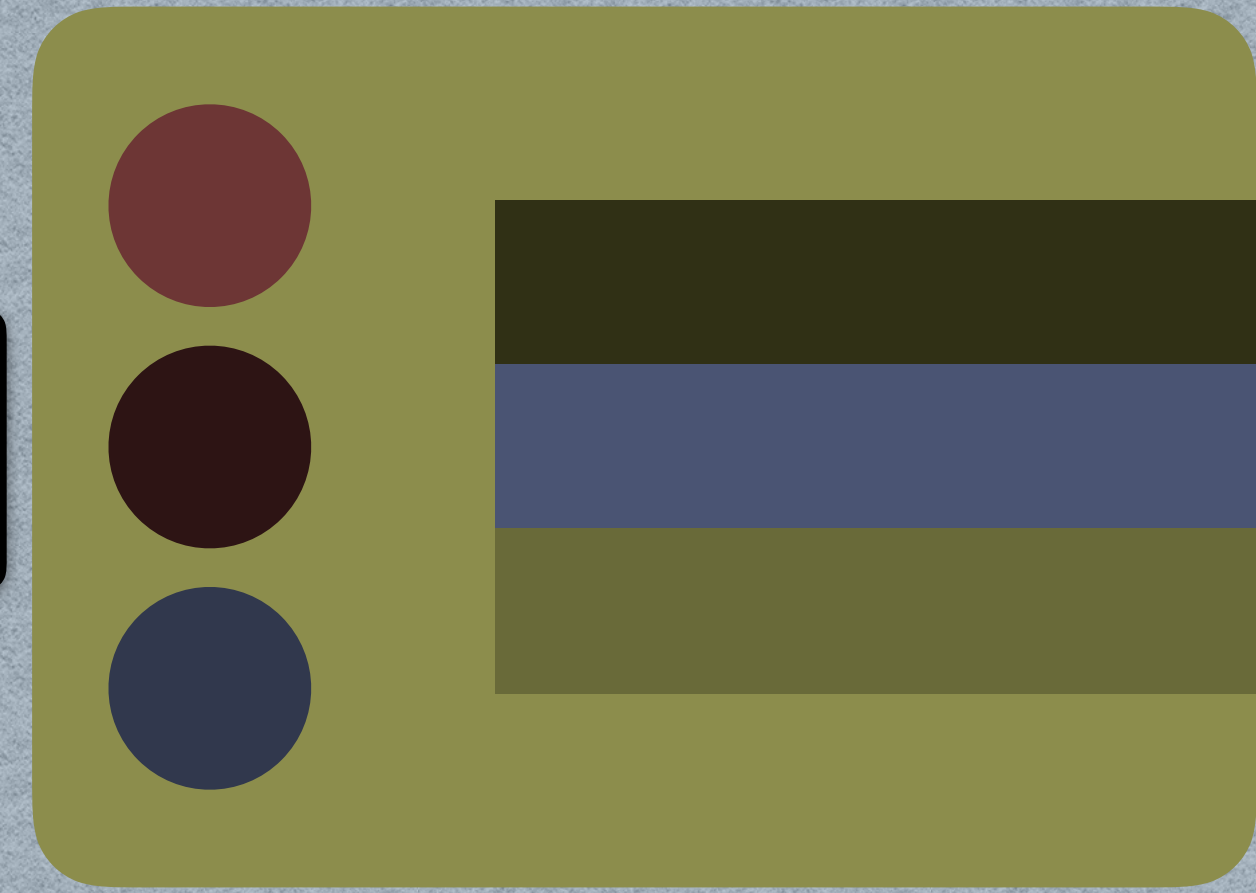
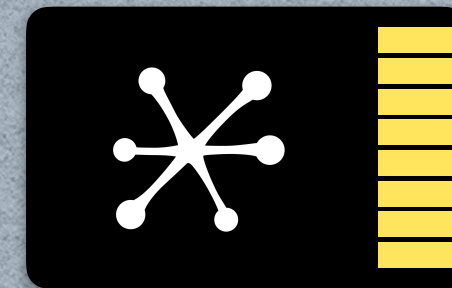
Elixir Circuits Quickstart

All of the Elixir Circuits projects are available in this firmware
image. See https://github.com/elixir-circuits/circuits\_quickstart for
more details.

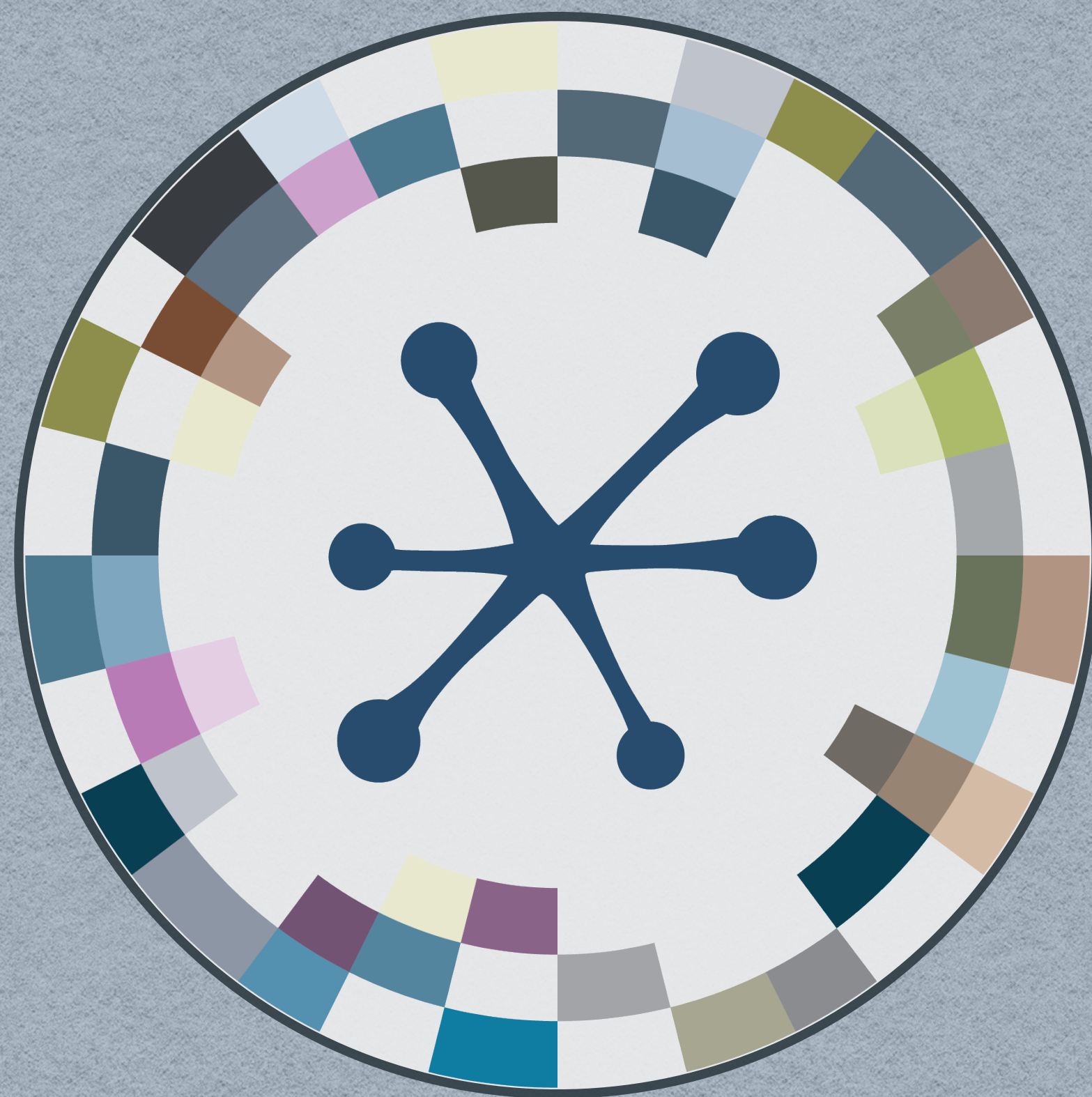
View log messages with `RingLogger.next` or `RingLogger.attach`. Toolshed
helpers are available. Type `h Toolshed` for details.

If connecting via ssh, type `exit` or `~.` to disconnect.

iex(circuits_quickstart@nerves.local)1> |
```

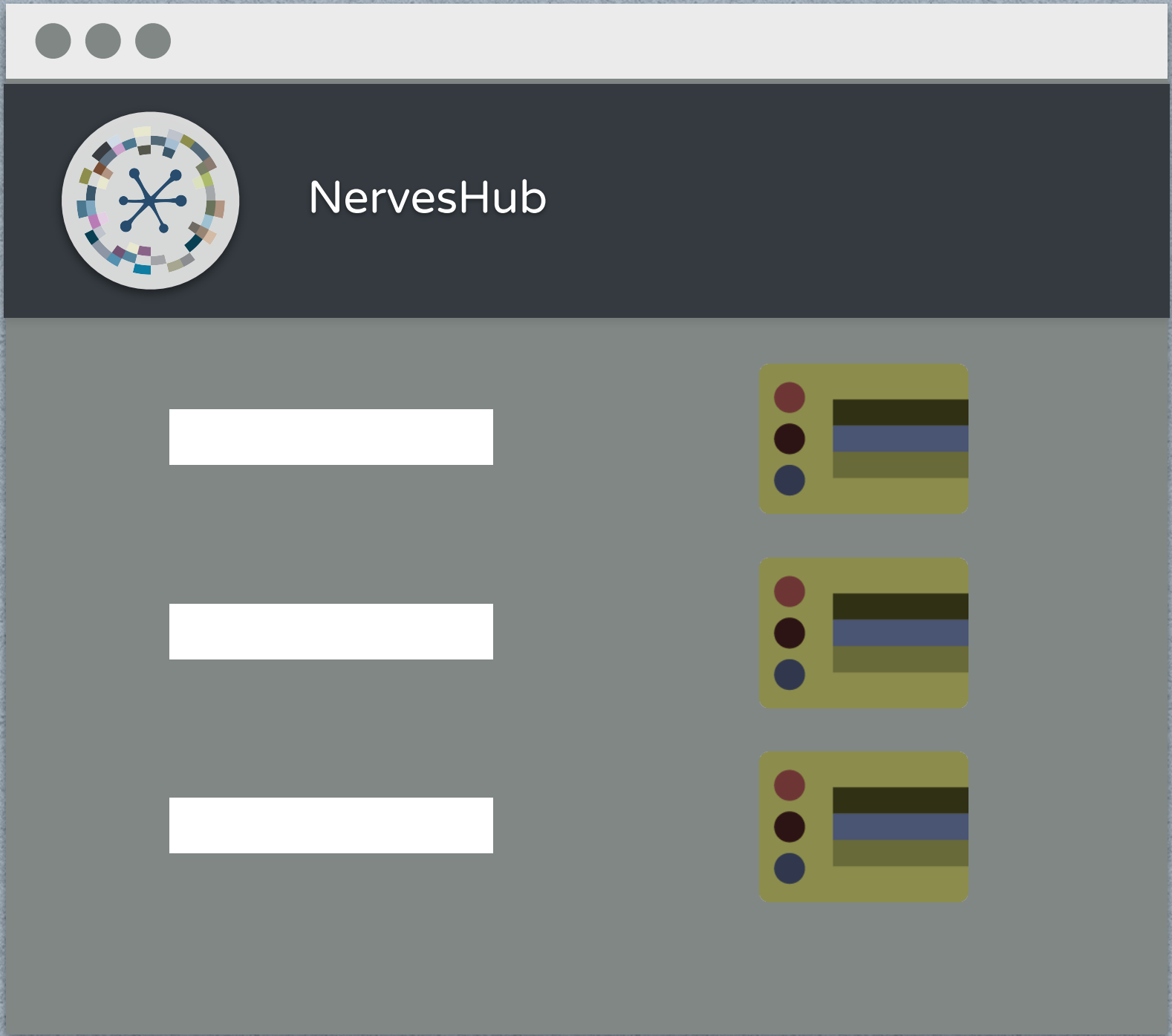


Demo

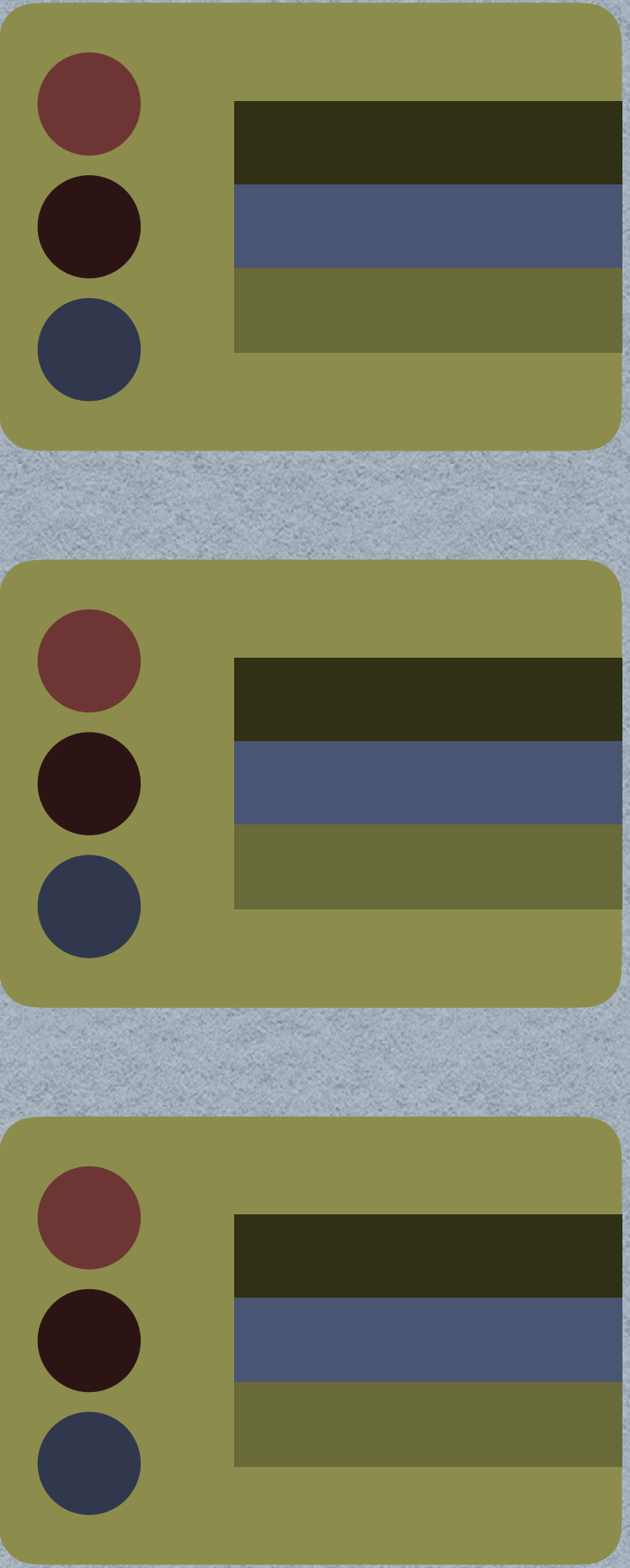


Nerves Hub

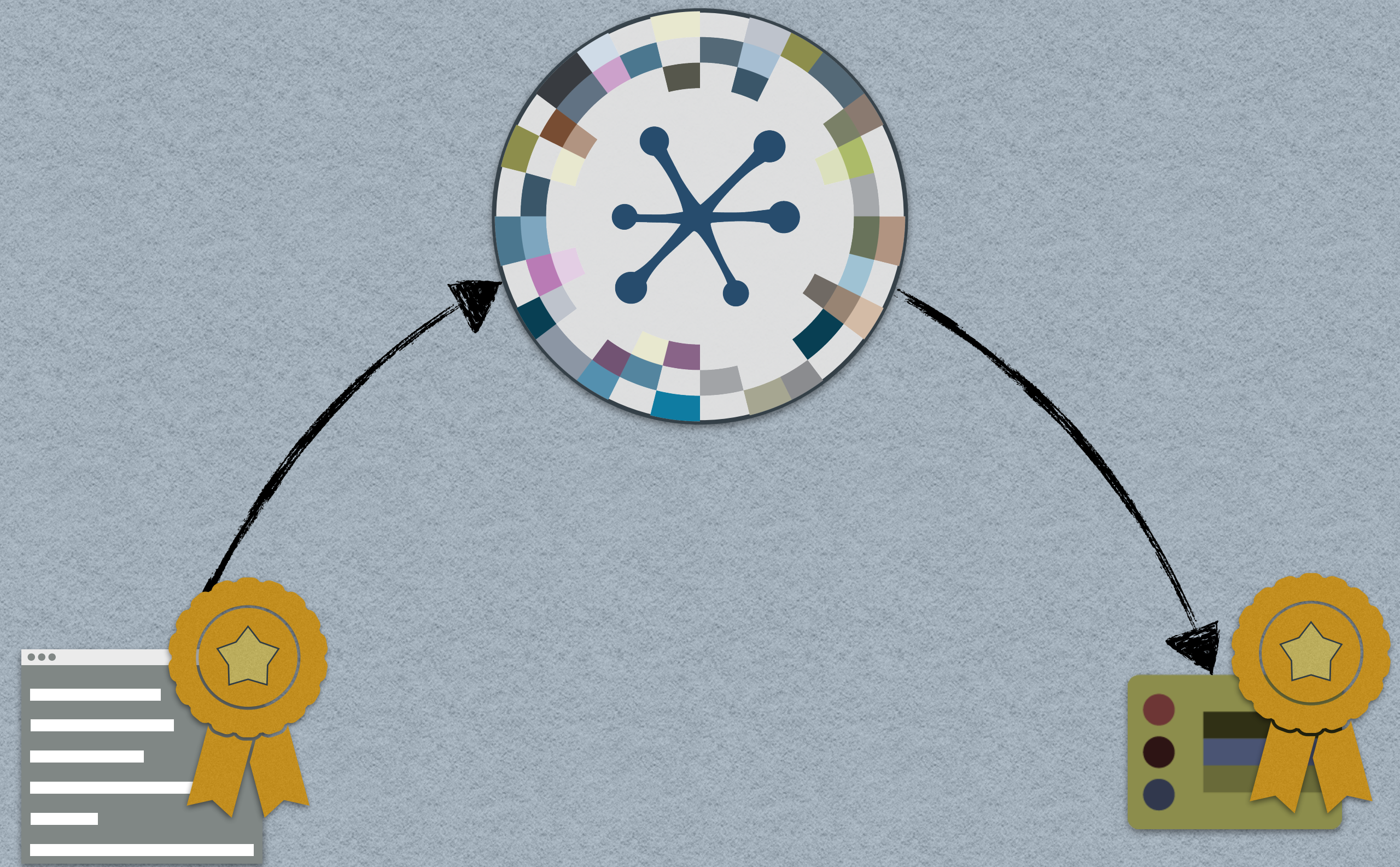
Server



Devices

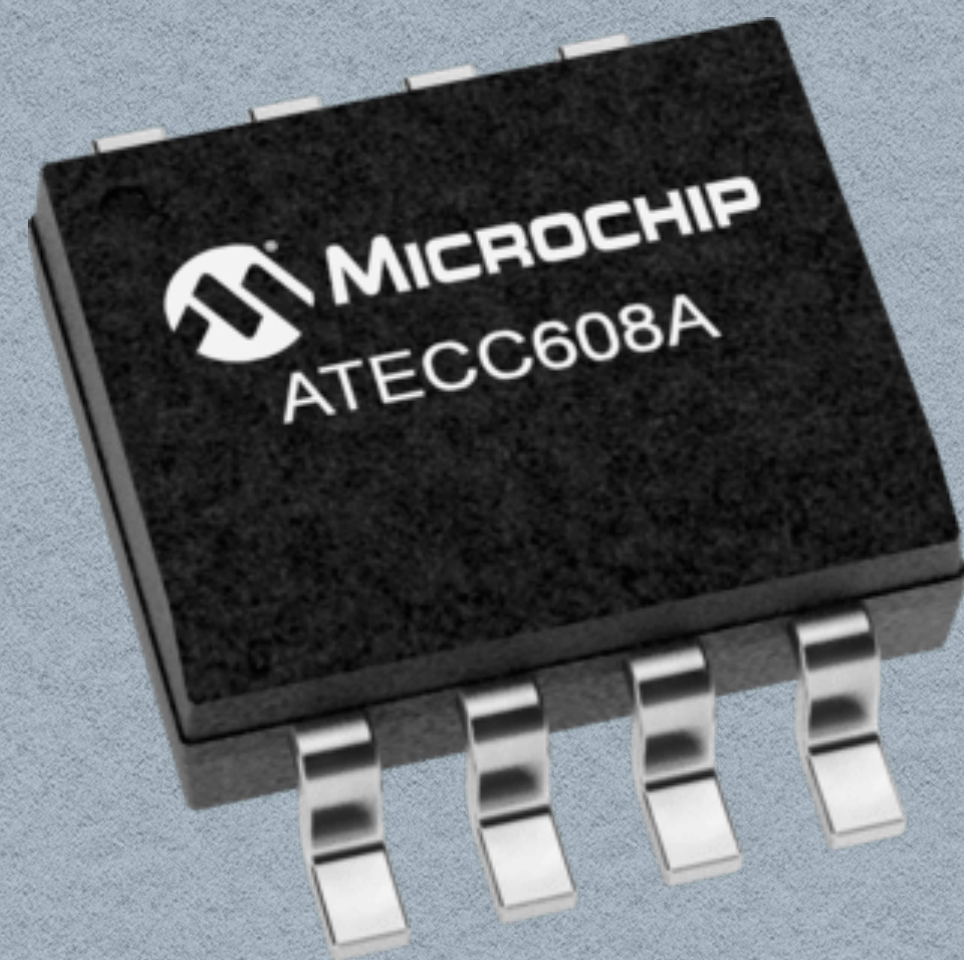


Socket or HTTP



Firmware uploaded
to a NervesHub
server

Devices
download firmware



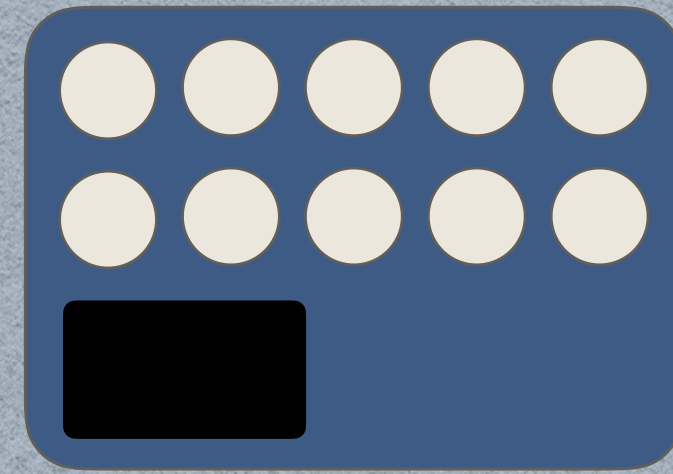
CryptoAuthentication chip

ATECC508/608A

CryptoAuthentication chip

Nerves Key

- ATECC508/608A
- Stores private key
- Additional Certificates
- Additional settings storage



Provisioning in Elixir - nerves-hub.org

docs.nerves-hub.org/nerves-key/provisioning-in-elixir

nerves-hub

Search...

Private keys and certificates

General NervesKey storage

Quickstart

Provisioning in Elixir

Nerves integration

NervesHub integration

MQTT integration

USER API

Users

Firmware Signing Keys

FAQ

DEVICE API

Overview

Phoenix Channel

HTTP Endpoint

Provisioning in Elixir

The quickstart firmware is useful for getting started with NervesKeys. This section describes one way of provisioning NervesKeys programmatically. More sophisticated and automated ways are certainly possible.

Prerequisites

To provision a NervesKey, make sure that you have the following:

1. A Device CA certificate and its private certificate (this is also referred to as a signing certificate)
2. A serial number for your device
3. A name for the device

The signing certificate and serial number are very important. After the provisioning

Remote console

The screenshot shows a web browser window with the NervesHub interface. The browser's address bar shows the URL `nerves-hub.local/org/jschneck/snake_remote_display/devices/AER2XGDLPV7GV3Q/console`. The page header includes the NervesHub logo and the text `jschneck | snake_remote_display`. A sidebar on the left contains three menu items: `Devices`, `Firmware`, and `Deployments`. The main content area is a terminal window with a black background and white text. The terminal output shows the following sequence of commands and responses:

```
NervesHub IEx Live  
iex(jschneck)> uname  
Nerves nerves-aer2xgdlpv7gv3q snake_remote_display 0.1.0 (796dc7b1-eeeb-5119-f629-1d36cd4bb61f) arm  
iex(jschneck)>
```

Running NervesHub

Hosted

nerves-hub.org

Trial accounts available

Scaleable and secure

Private

yourdomain.com

unlimited

Managed by you

github.com/nerves-hub/terraform

nerves-hub/terraform: Terraform x +

GitHub, Inc. [US] | github.com/nerves-hub/terraform

Search or jump to... / Pull requests Issues Marketplace Explore

nerves-hub / terraform Watch 0 Star 3 Fork 0

Code Issues 0 Pull requests 0 Projects 0 Wiki Security Insights Settings

Terraform files Edit

Manage topics

7 commits 2 branches 0 releases 1 contributor

Branch: master New pull request Create new file Upload files Find File Clone or download

mobileoverlord Update readme Latest commit 1ca2808 22 days ago

app	Make it all work!	22 days ago
base	Construct the www service	24 days ago
billing	Make it all work!	22 days ago
common	Initial bootstrapping	28 days ago
modules	Make it all work!	22 days ago
setup	Make it all work!	22 days ago
ssl	Construct the www service	24 days ago

Companies using Nerves

Some companies using Nerves



LE TOTE



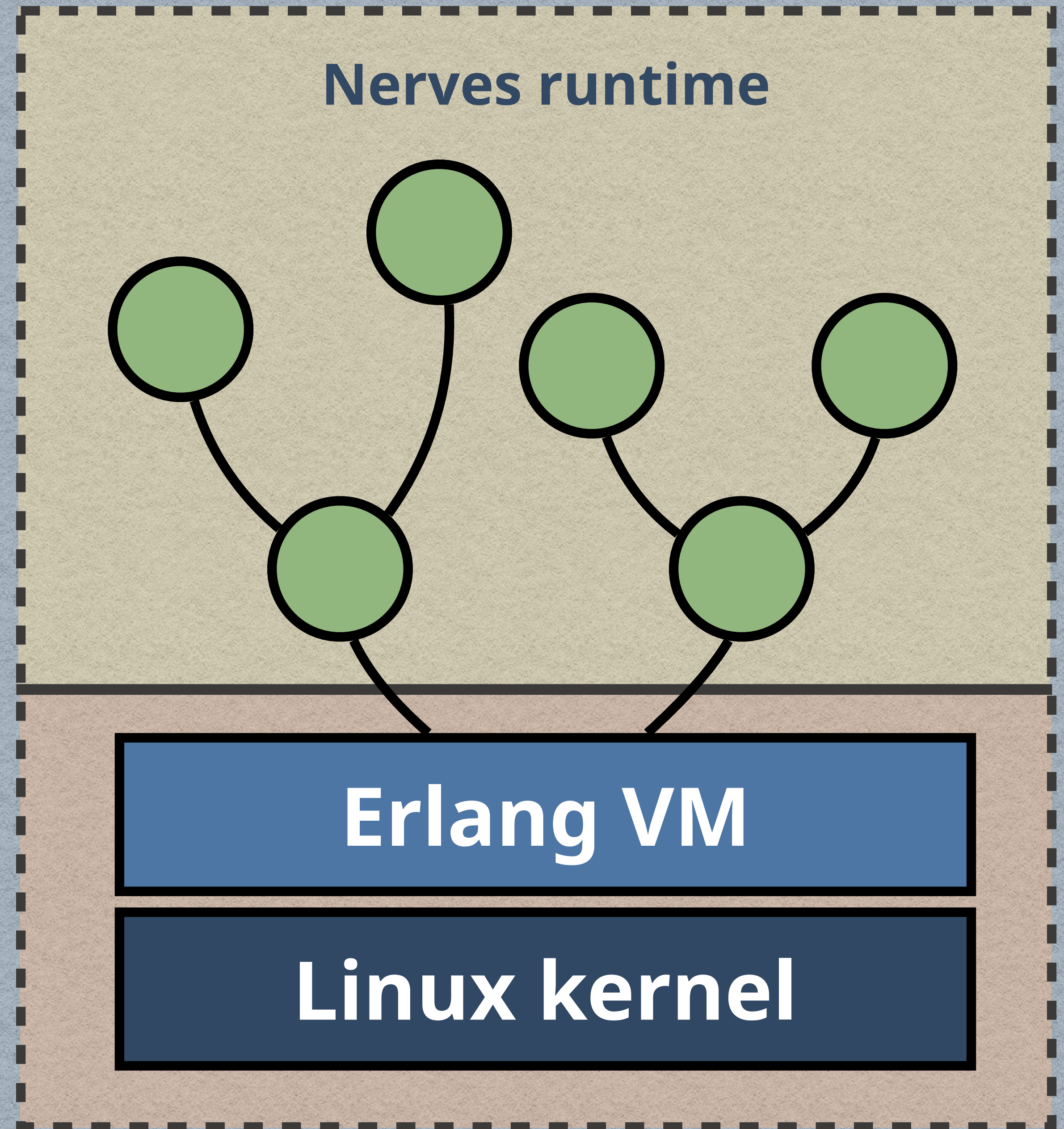
very



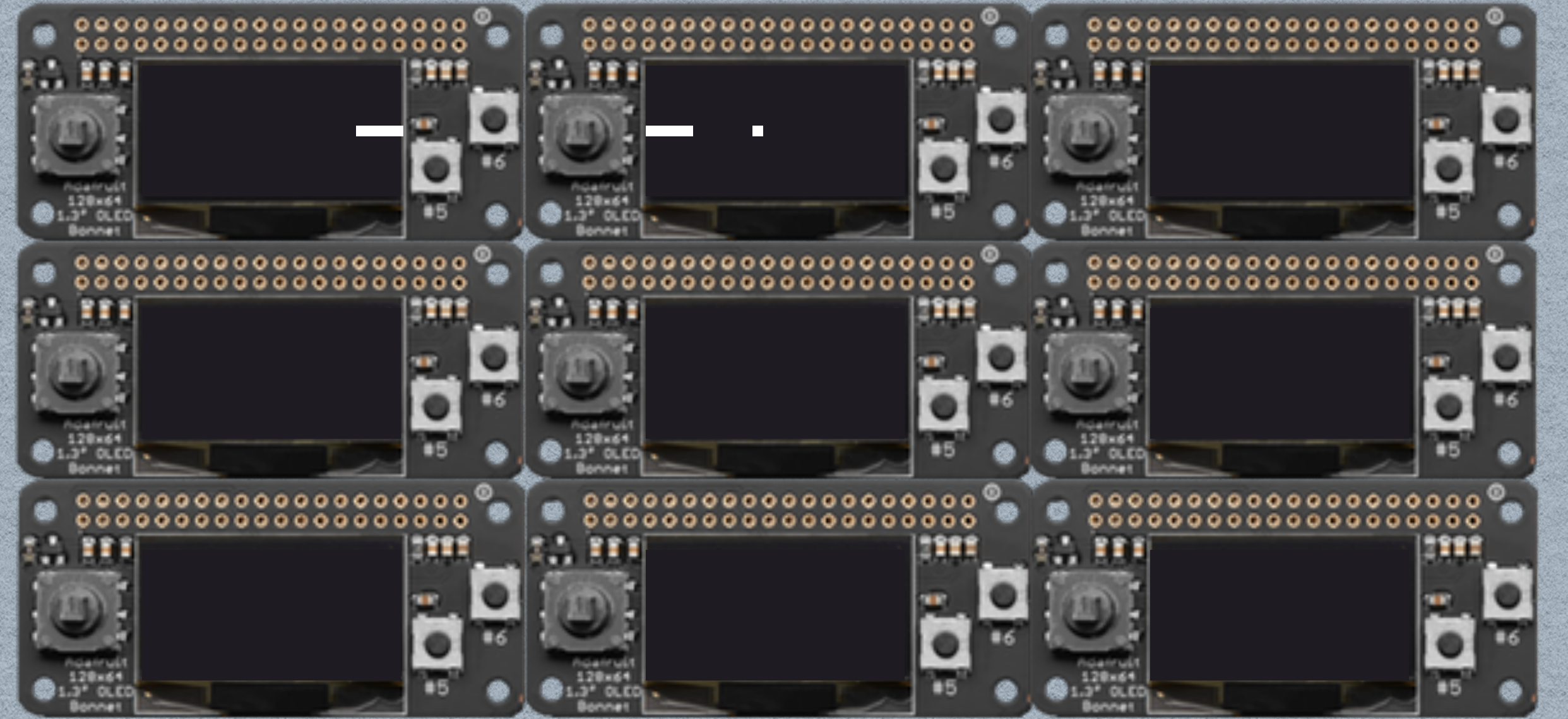
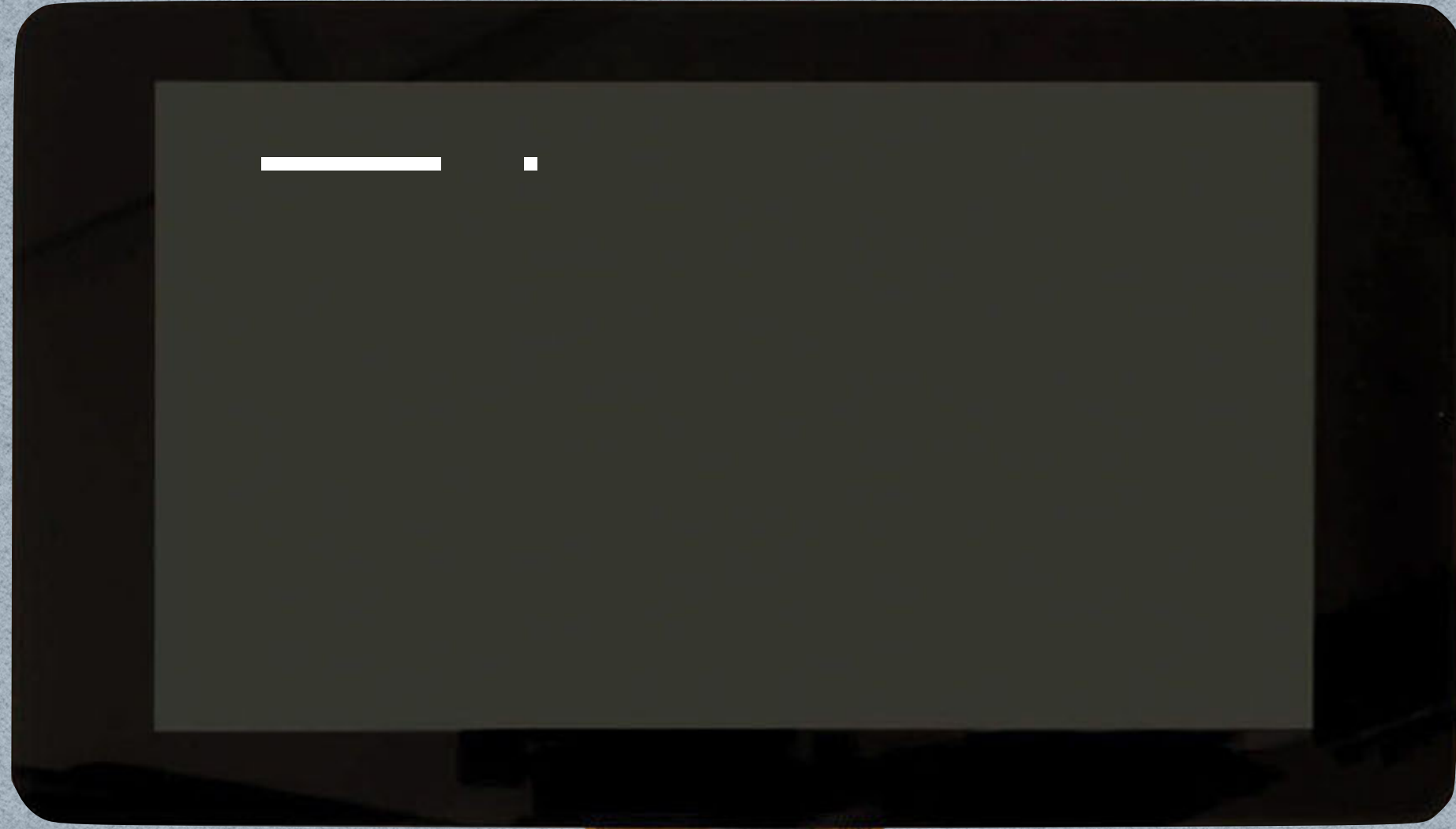
Nerves



Resilient
レジリエント



**Distributed
computing
Demo**



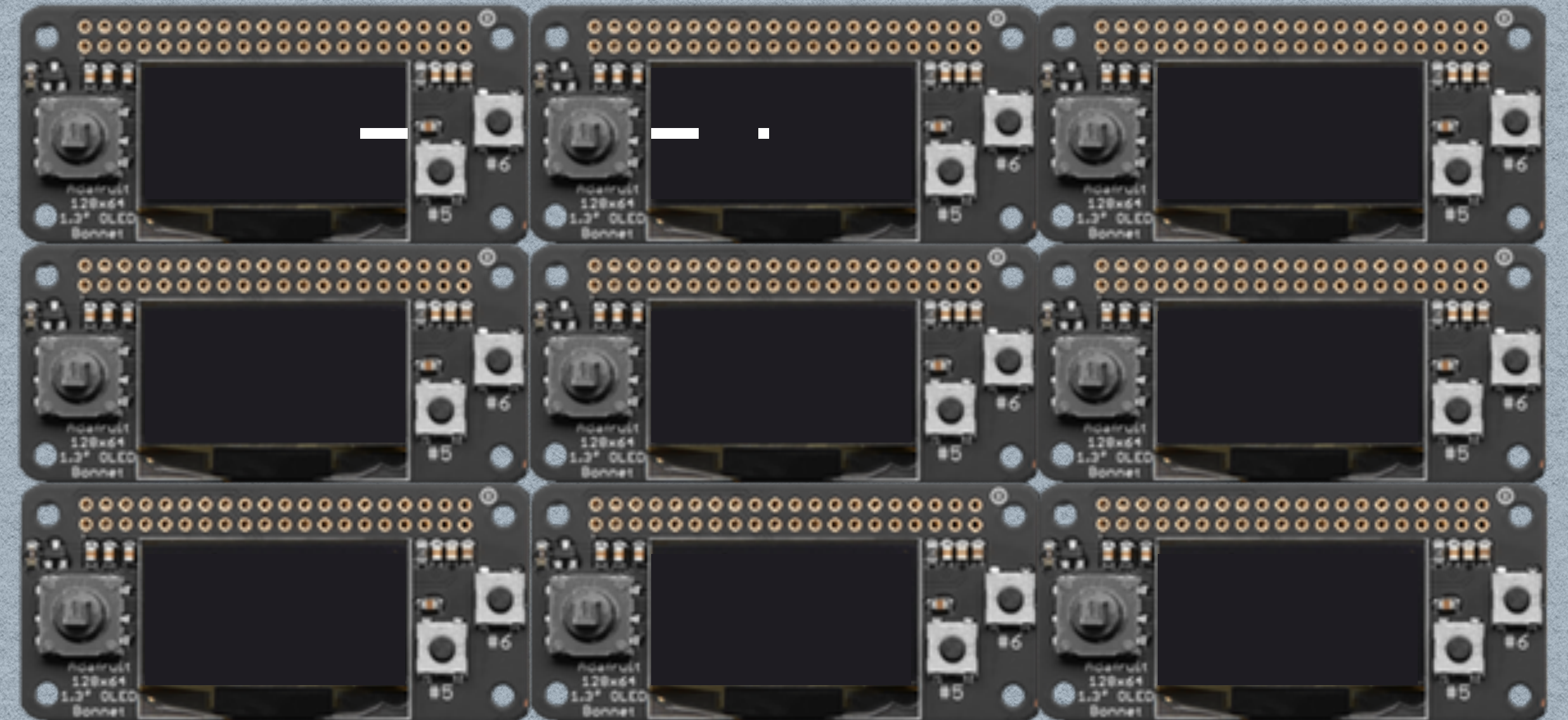
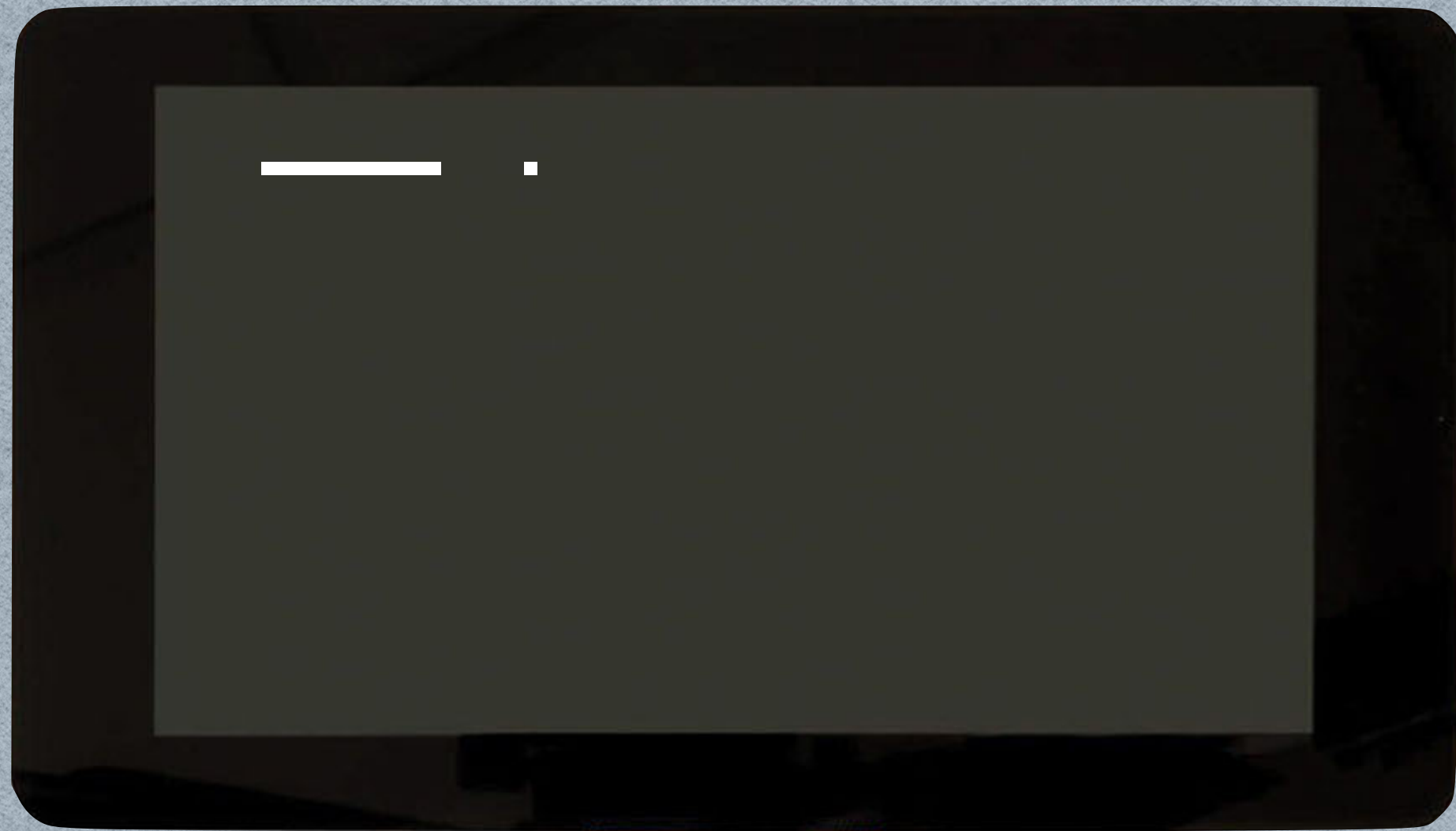
Raspberry Pi 3
1.4 GHz Quad core

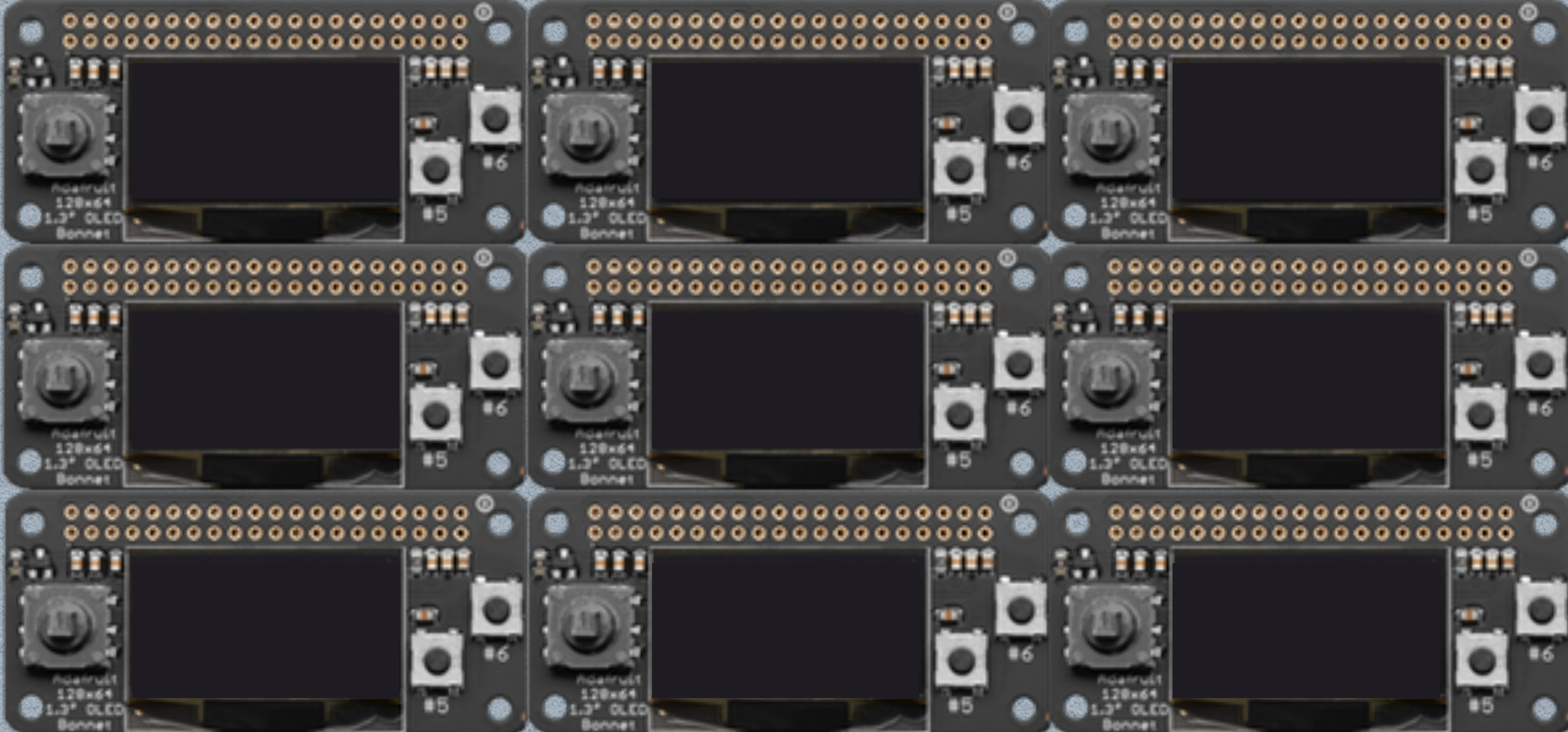
+

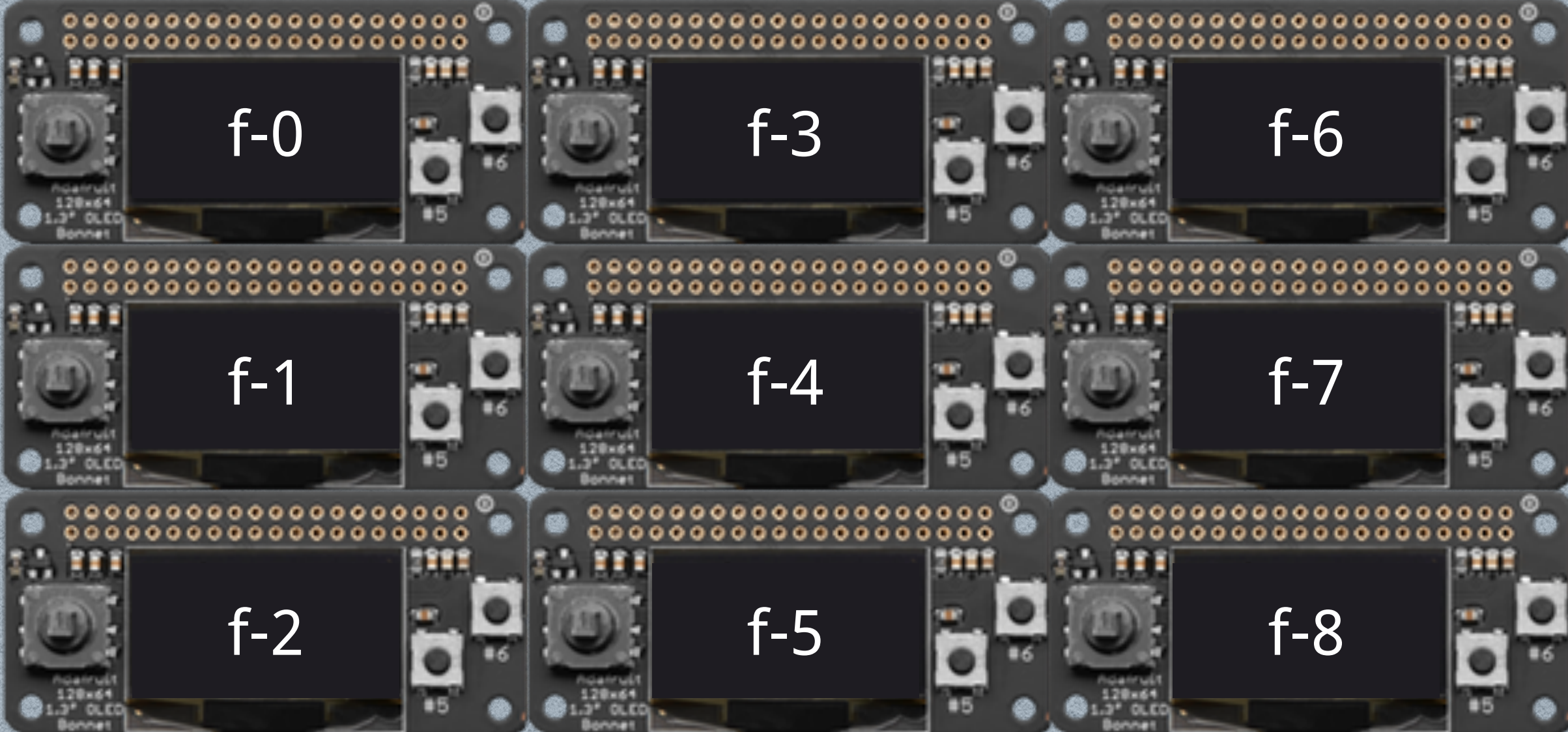
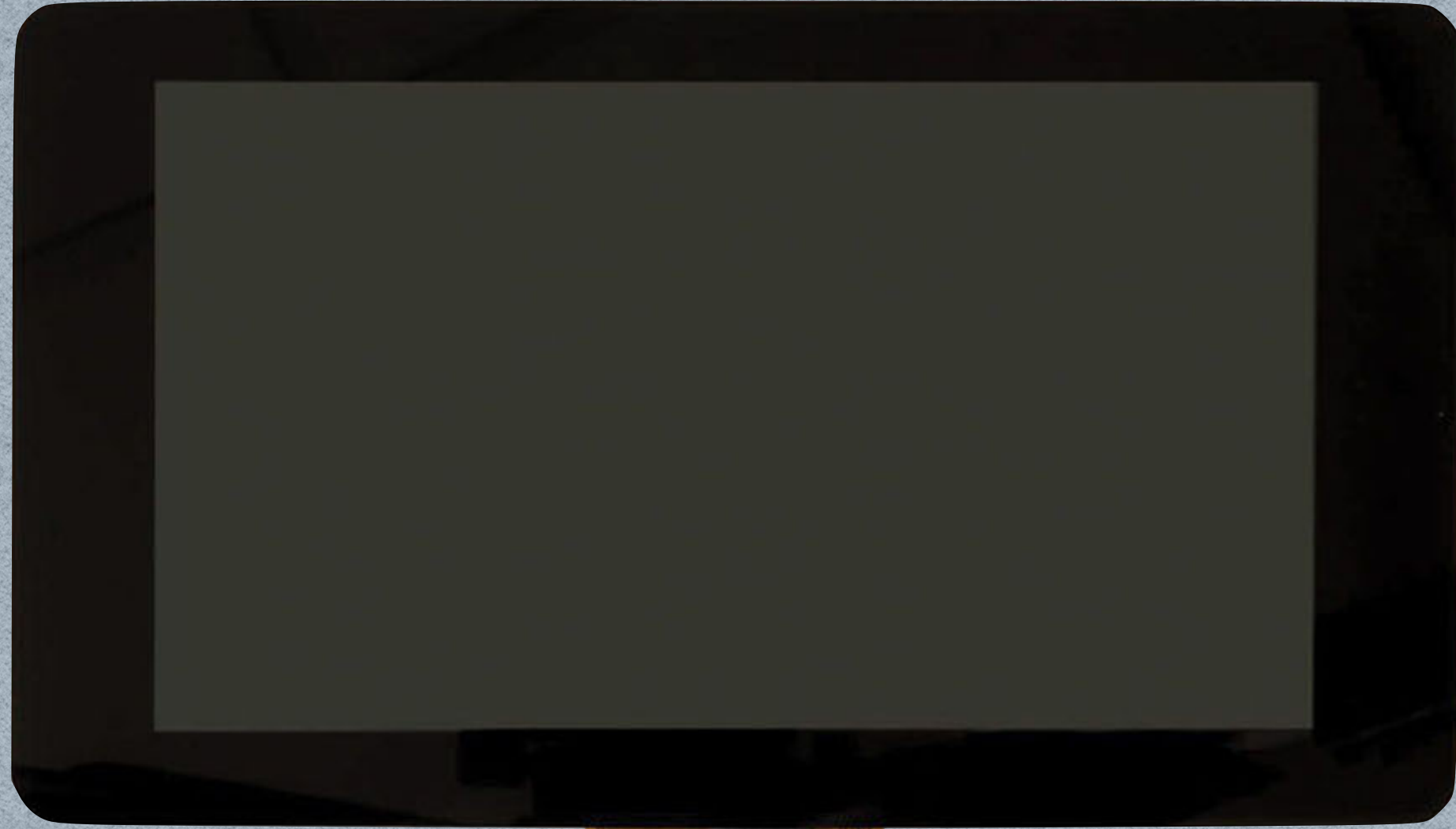
Raspberry Pi 0
1 GHz Single core

x 9 ==

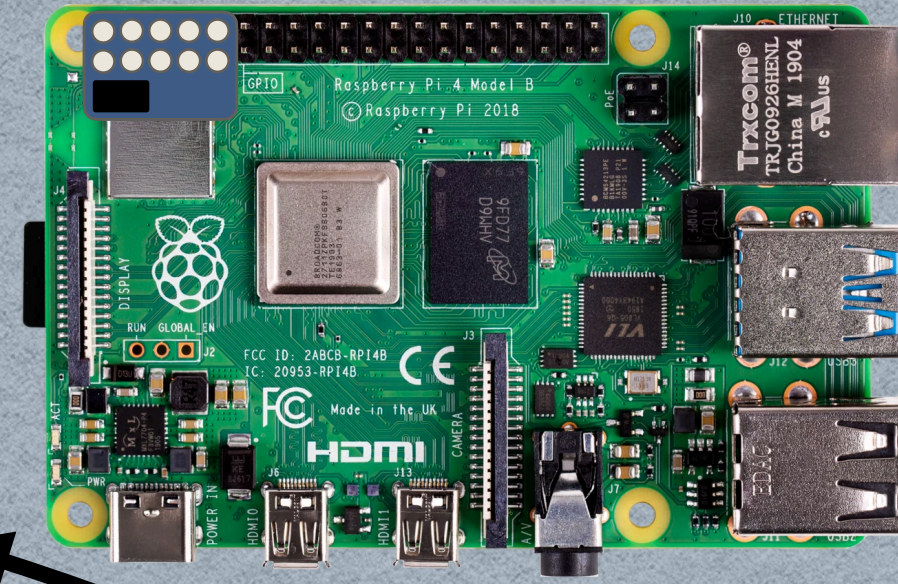
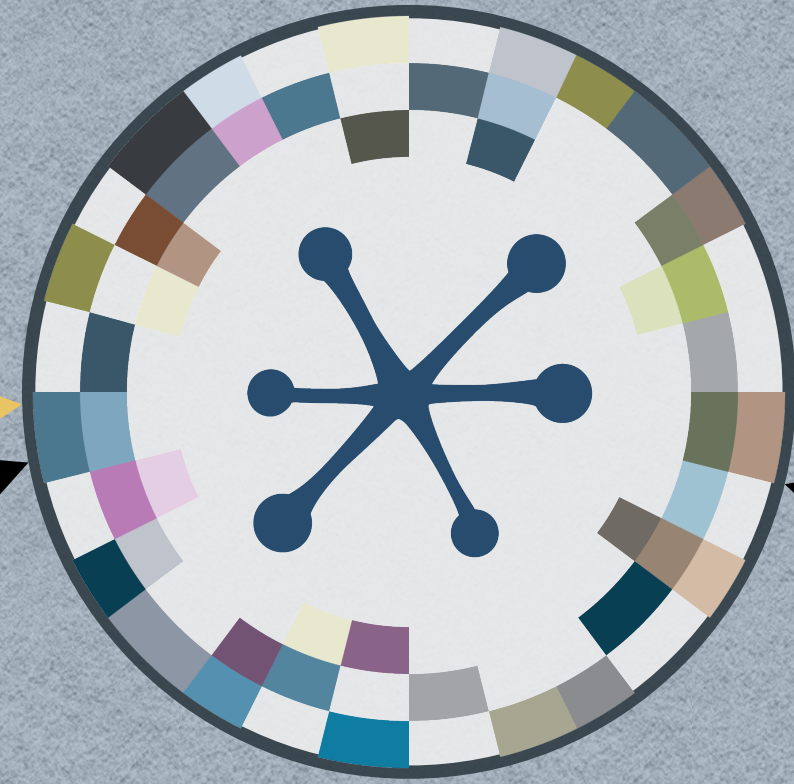
13 Cores
5.5 Gb Ram



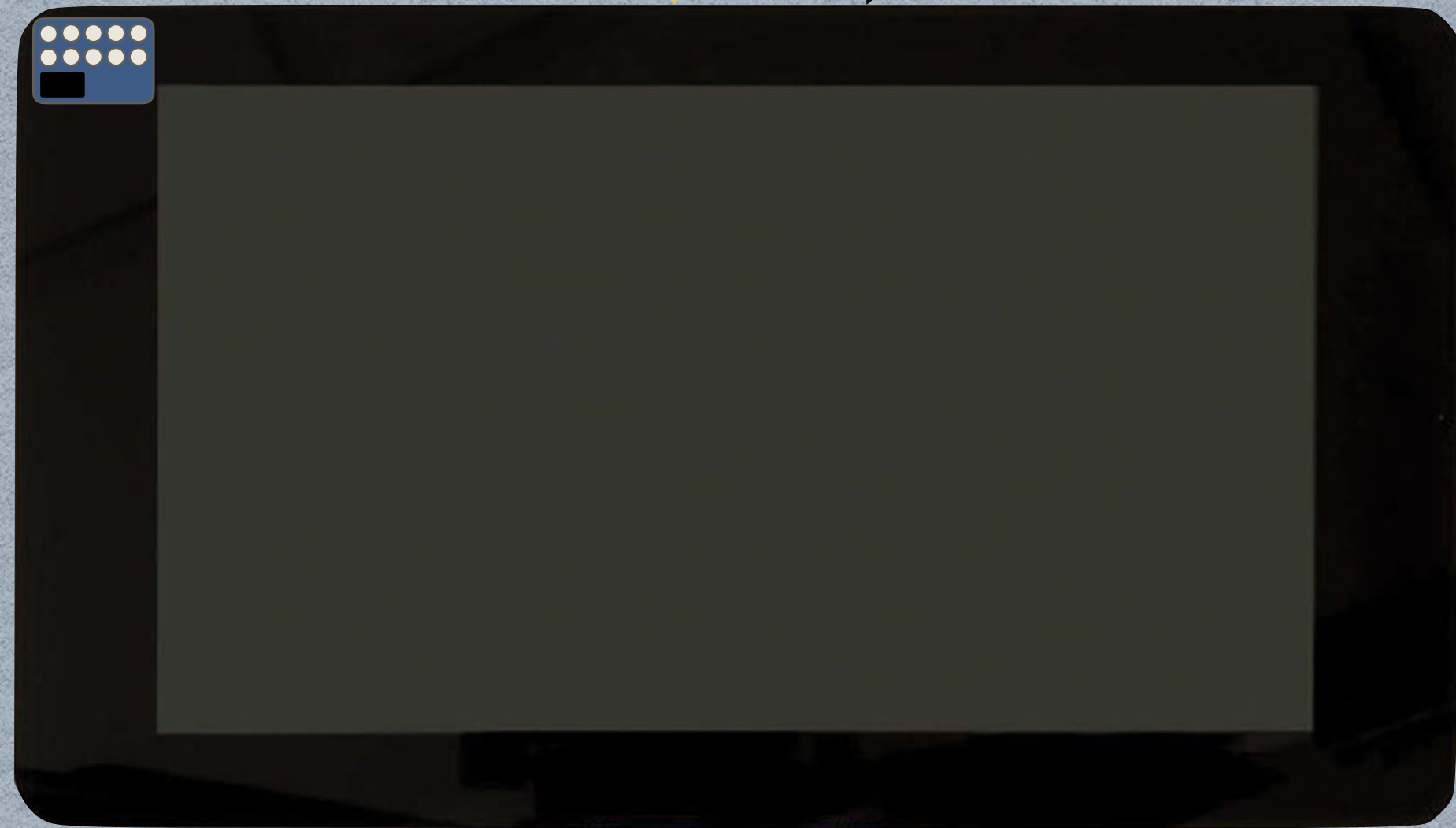




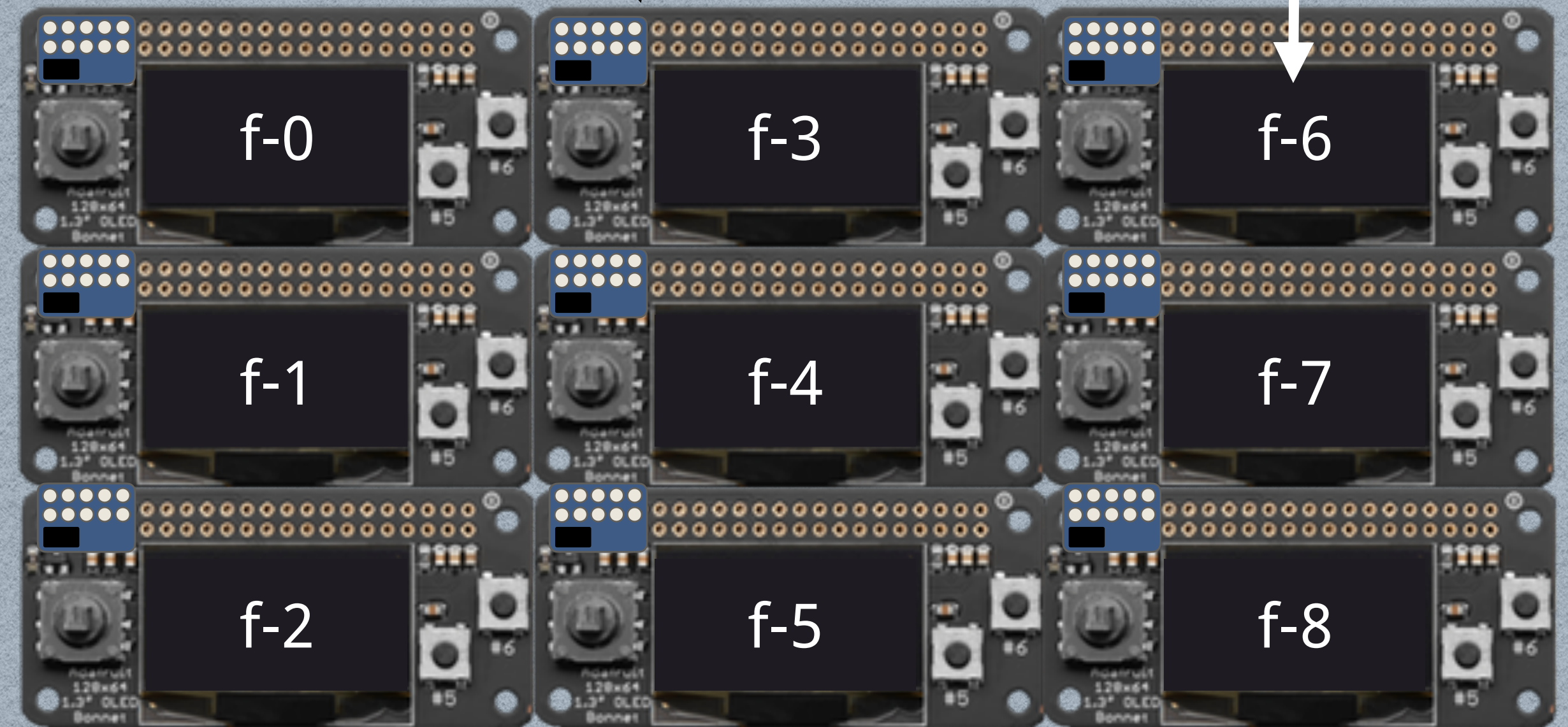
NervesHub
Delegate
Auth

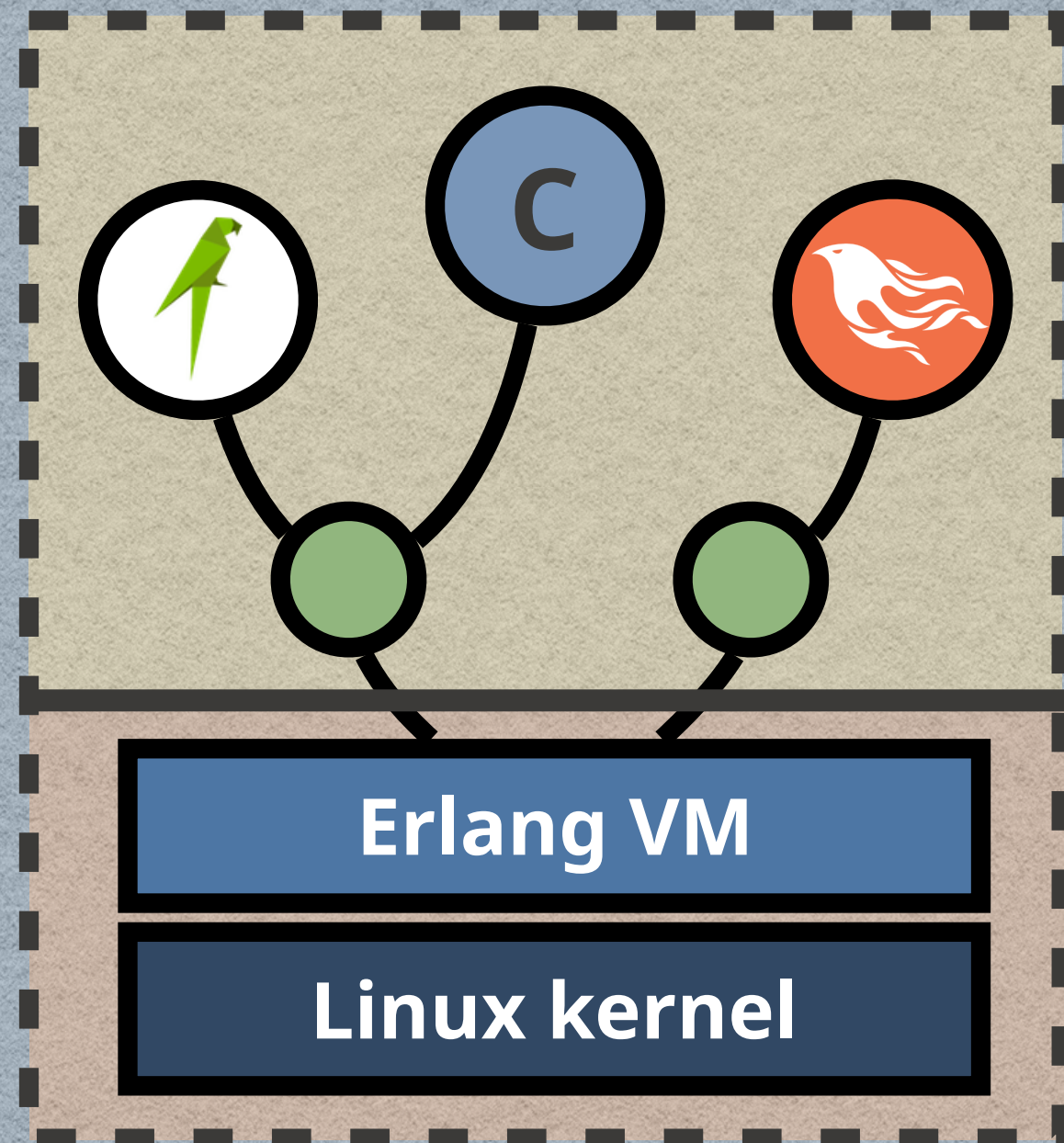
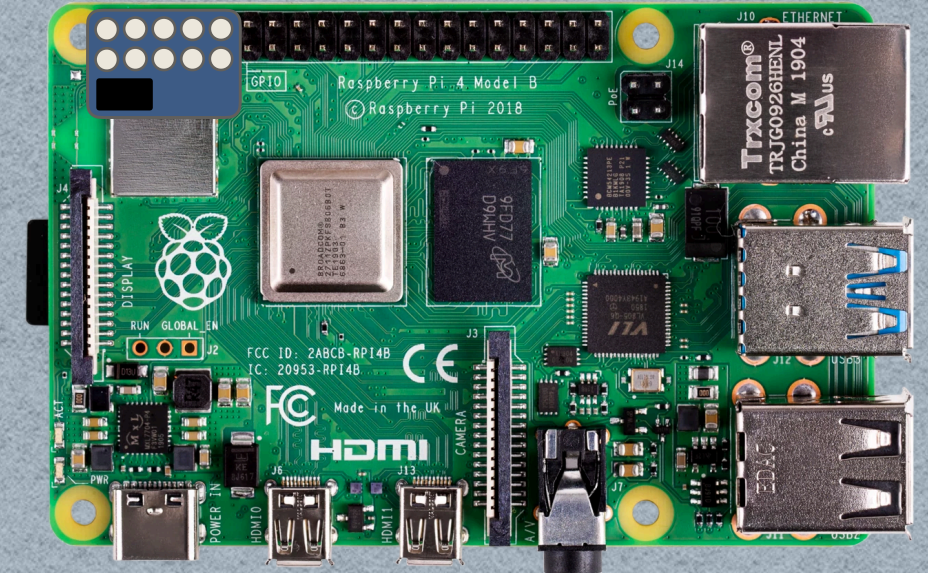


NervesHub
device
tag

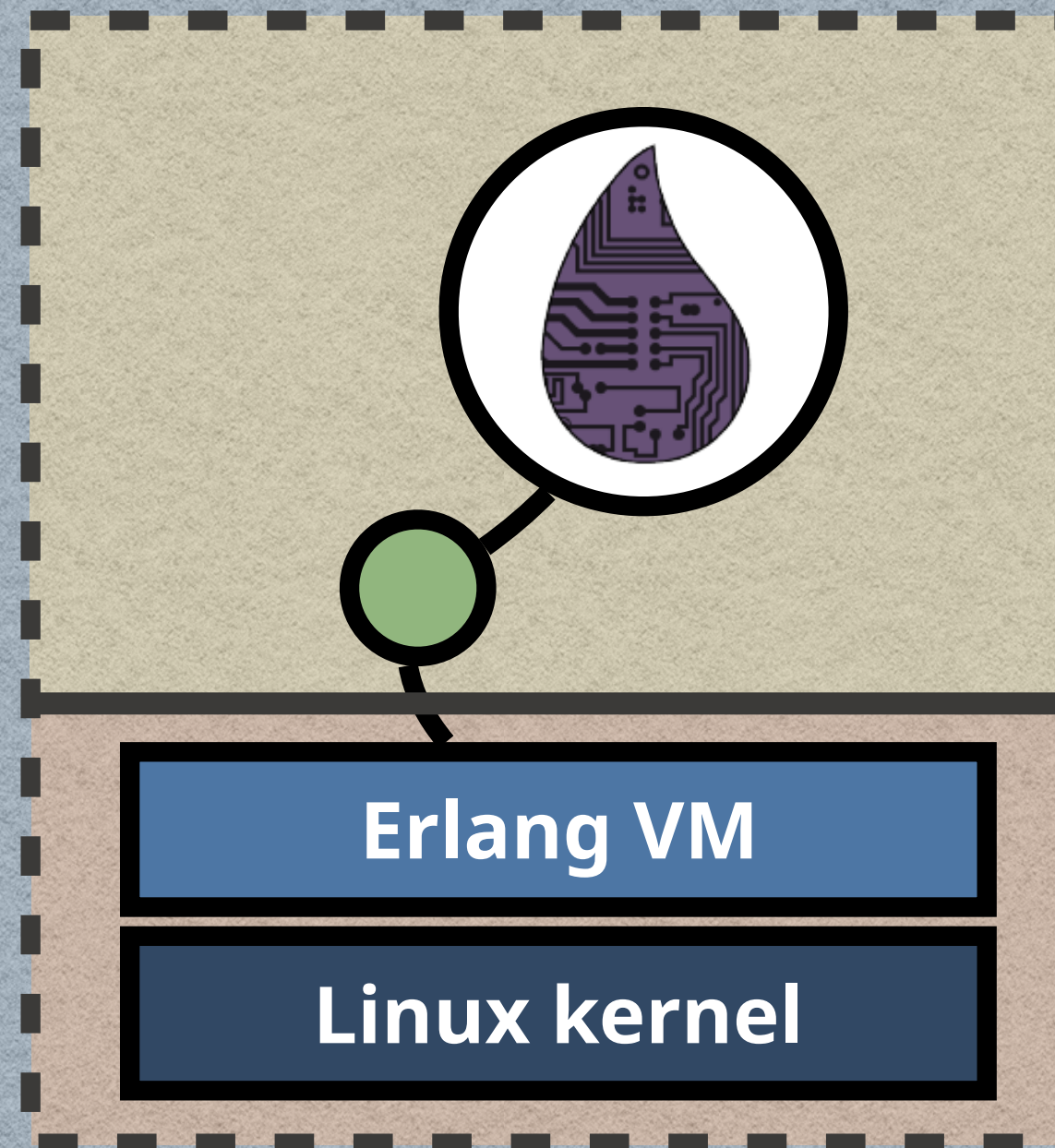


Phoenix
Channels

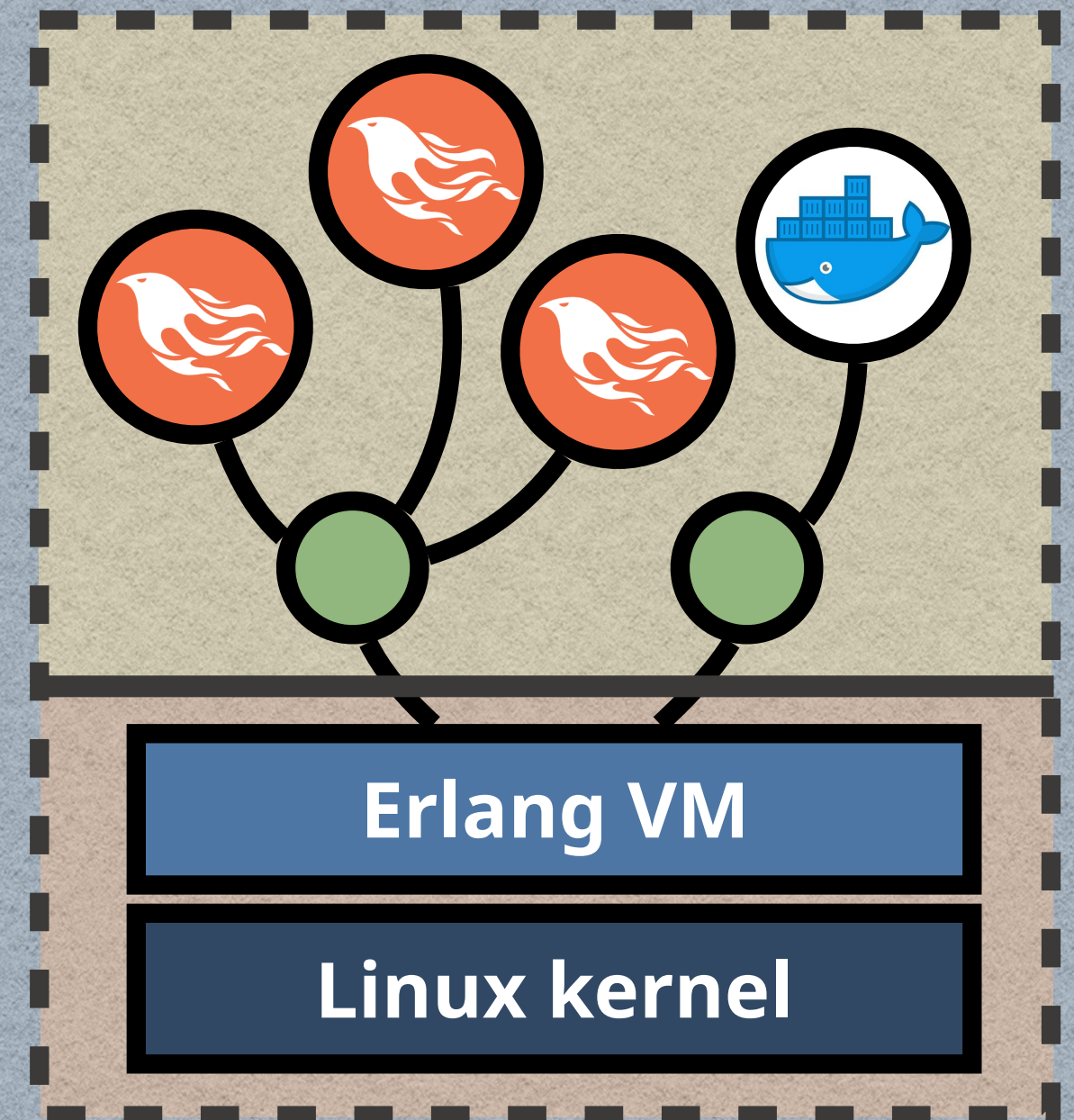




SnakeServer



SnakeRemoteDisplay



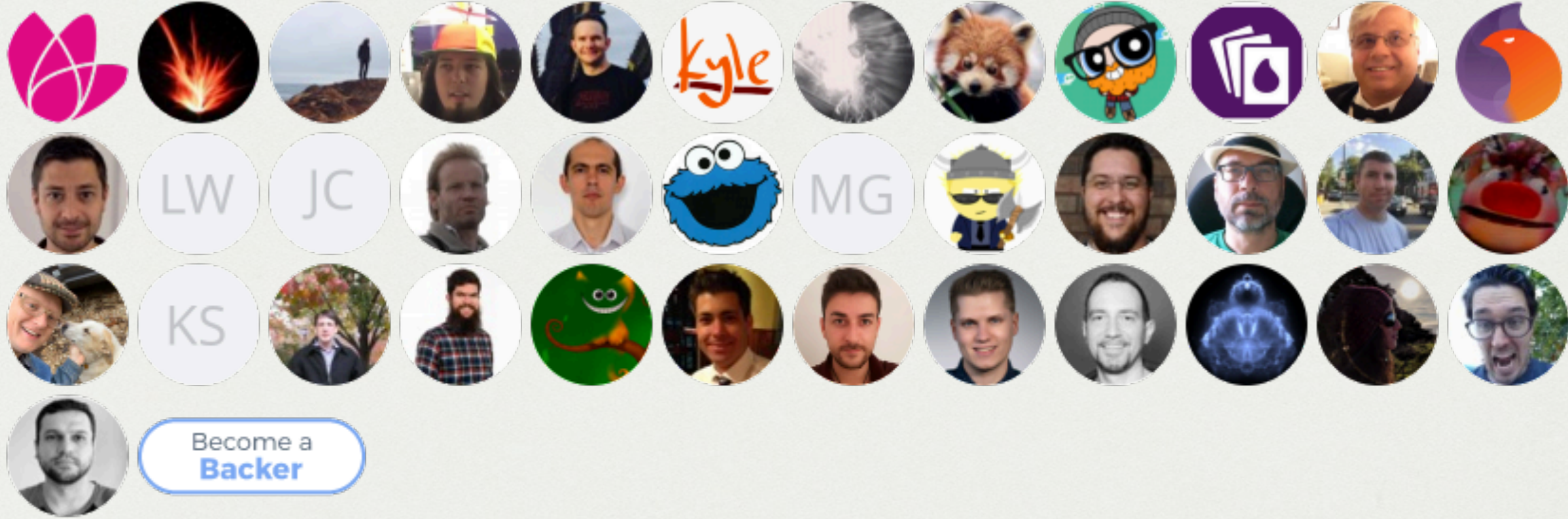
NervesHubWebServer

Demo

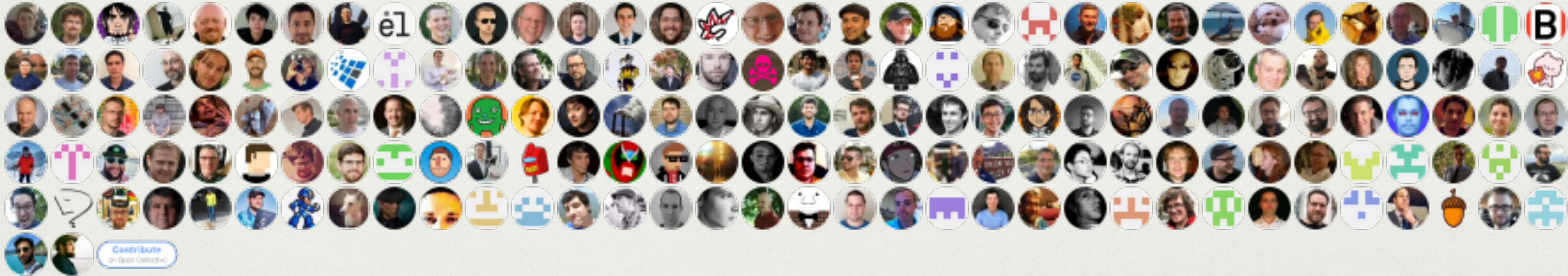
Nerves is a foundation for building
resilient embedded systems.

**Nerves can run on any
hardware that supports
embedded Linux**

Sponsors



Contributors



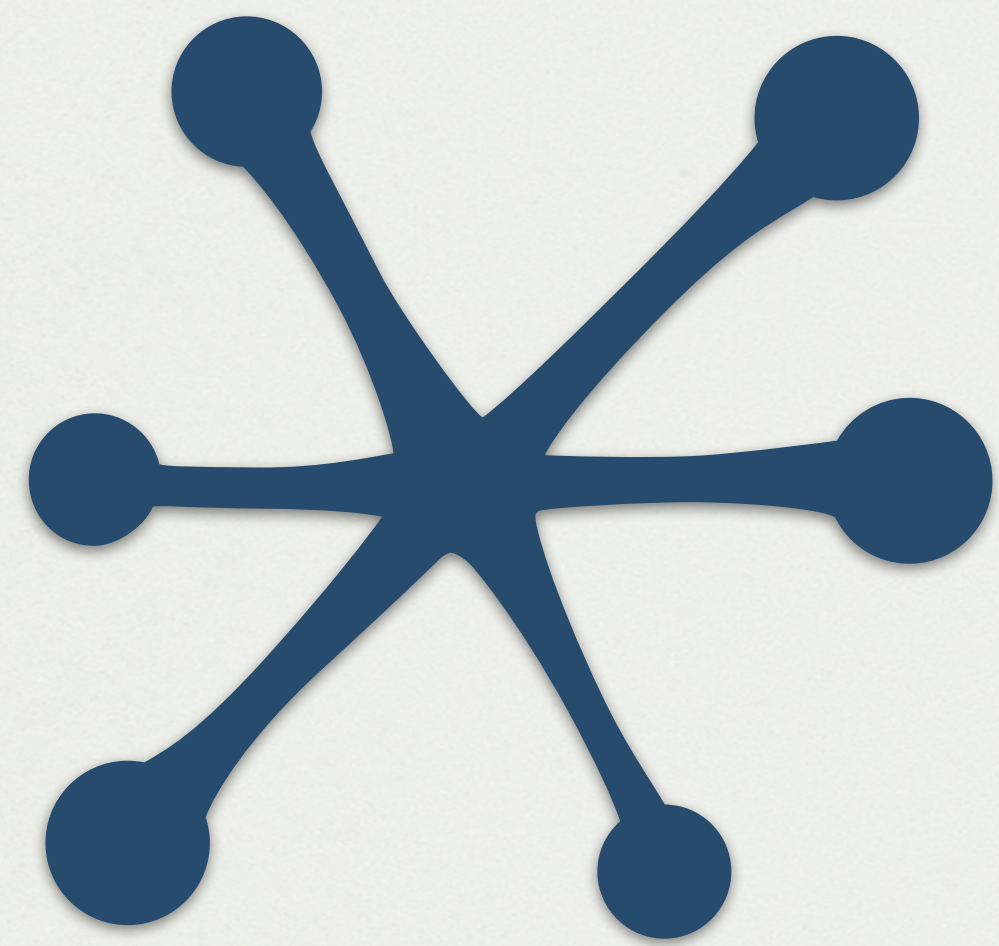
Join in and ask questions

Elixir Forum

<https://elixirforum.com/c/nerves-forum>

Elixir Slack

<https://elixir-slackin.herokuapp.com/>



**Thank
You**

@mobileoverlord

@NervesProject

