DEVCONF

Fending off Zombies with OTP

Dave Long

BUILDING TELEPHONY APPLICATIONS WITH TWILIO AND ELIXIR

@davejlong PGP (4FF9ED7C)

DAVE LONG

DIRECTOR OF DEVELOPMENT @ CAGE DATA

Husband & Father
Missionary to Uganda
@davejlong on Twitter / GitHub / Keybase
davejlong.com on Web


SUBSCRIBE TO THE APPLICATION AT
ZOMBIES.DAVEJLONG.COM
@davejlong PGP (4FF9ED7C)

FENDING OFF ZOMBIES

1. What is Elixir?
2. What is OTP?
3. What is Twilio?
4. Let's build something!

@davejlong PGP (4FF9ED7C)

WHAT IS ELIXIR?

Elixir is a dynamic, functional language designed for building scalable and maintainable applications.

– elixir-lang.org

ELIXIR IS...

- Scalable
- Fault-Tolerant
- Functional
- Extensible

@davejlong PGP (4FF9ED7C)

```elixir
current_process = self()

# Spawn an Elixir process (not an operating system one!)
spawn_link(fn ->
  send current_process, {:msg, "Must eat brains!"}
end)

# Block until the message is received
receive do
  {:msg, contents} -> IO.puts contents
end
```

```elixir
current_process = self()

# Spawn an Elixir process (not an operating system one!)
spawn_link(fn ->
  send current_process, {:msg, "Must eat brains!"}
end)

# Block until the message is received
receive do
  {:msg, contents} -> IO.puts contents
end
```

```elixir
current_process = self()

# Spawn an Elixir process (not an operating system one!)
spawn_link(fn ->
  send current_process, {:msg, "Must eat brains!"}
end)

# Block until the message is received
receive do
  {:msg, contents} -> IO.puts contents
end
```

```elixir
current_process = self()

# Spawn an Elixir process (not an operating system one!)
spawn_link(fn ->
  send current_process, {:msg, "Must eat brains!"}
end)

# Block until the message is received
receive do
  {:msg, contents} -> IO.puts contents
end
```

```
import Supervisor.Spec

children = [
  supervisor(Zombie.Hoard, []),
  worker(Hunter, [])
]

Supervisor.start_link(children, strategy: :one_for_one)
```


@davejlong PGP (4FF9ED7C)

```
import Supervisor.Spec

children = [
  supervisor(TCP.Pool, []),
  worker(TCP.Acceptor, [4040])
]

Supervisor.start_link(children, strategy: :one_for_all)
```

```elixir
def shoot(%Weapon{uses: ammo, type: "rifle"}) when ammo > 0 do
  #  You shot a zombie!
end

def shoot(%Weapon{uses: uses, type: "knife"}) when uses > 0 do
  # You shot a zombie, but were too close and
  # got eaten by others
end

def shoot(_), do: # You're a zombie now.

shoot Weapon.gets("Dessert Eagle")
#=> Fails if the weapon has no more uses
```

OBJECT ORIENTED CODE

```
title. # <= "Top 3 Reasons To Love Zombies!"
  downcase.
  gsub(/\W/, " "). # convert non-word chars (like -,!) into spaces
  split.           # drop extra whitespace
  join("-")        # join words with dashes
```

OBJECT ORIENTED CODE

```
title. # <= "Top 3 Reasons To Love Zombies!"
  downcase.
  gsub(/\W/, " "). # convert non-word chars (like -,!) into spaces
  split.           # drop extra whitespace
  join("-")        # join words with dashes
```

OBJECT ORIENTED CODE

```
title. # <= "Top 3 Reasons To Love Zombies!"
  downcase.
  gsub(/\W/, " "). # convert non-word chars (like -,!) into spaces
  split.           # drop extra whitespace
  join("-")        # join words with dashes
```

OBJECT ORIENTED CODE

```
title. # <= "Top 3 Reasons To Love Zombies!"
  downcase.
  gsub(/\W/, " "). # convert non-word chars (like -,!) into spaces
  split.           # drop extra whitespace
  join("-")        # join words with dashes
```

OBJECT ORIENTED CODE

```
title. # <= "Top 3 Reasons To Love Zombies!"
  downcase.
  gsub(/\W/, " "). # convert non-word chars (like -,!) into spaces
  split.           # drop extra whitespace
  join("-")        # join words with dashes
```

top-3-reasons-to-love-zombies"

FUNCTIONAL CODE

```
title # <= Top 3 Reasons To Love Zombies!
|> String.downcase
|> String.replace(~r/\W/, " ") # convert non-word chars (like -,!) into spaces
|> String.split                # drop extra whitespace
|> Enum.join("-")              # join words with dashes
```

FUNCTIONAL CODE

```
title # <= Top 3 Reasons To Love Zombies!
|> String.downcase
|> String.replace(~r/\W/, " ") # convert non-word chars (like -,!) into spaces
|> String.split                # drop extra whitespace
|> Enum.join("-")              # join words with dashes
```

FUNCTIONAL CODE

```
title # <= Top 3 Reasons To Love Zombies!
|> String.downcase
|> String.replace(~r/\W/, " ") # convert non-word chars (like -,!) into spaces
|> String.split                # drop extra whitespace
|> Enum.join("-")              # join words with dashes
```

FUNCTIONAL CODE

```
title # <= Top 3 Reasons To Love Zombies!
|> String.downcase
|> String.replace(~r/\W/, " ") # convert non-word chars (like -,!) into spaces
|> String.split                # drop extra whitespace
|> Enum.join("-")              # join words with dashes
```

FUNCTIONAL CODE

```
title # <= Top 3 Reasons To Love Zombies!
|> String.downcase
|> String.replace(~r/\W/, " ") # convert non-word chars (like -,!) into spaces
|> String.split                # drop extra whitespace
|> Enum.join("-")              # join words with dashes
```

top-3-reasons-to-love-zombies

FUNCTIONAL

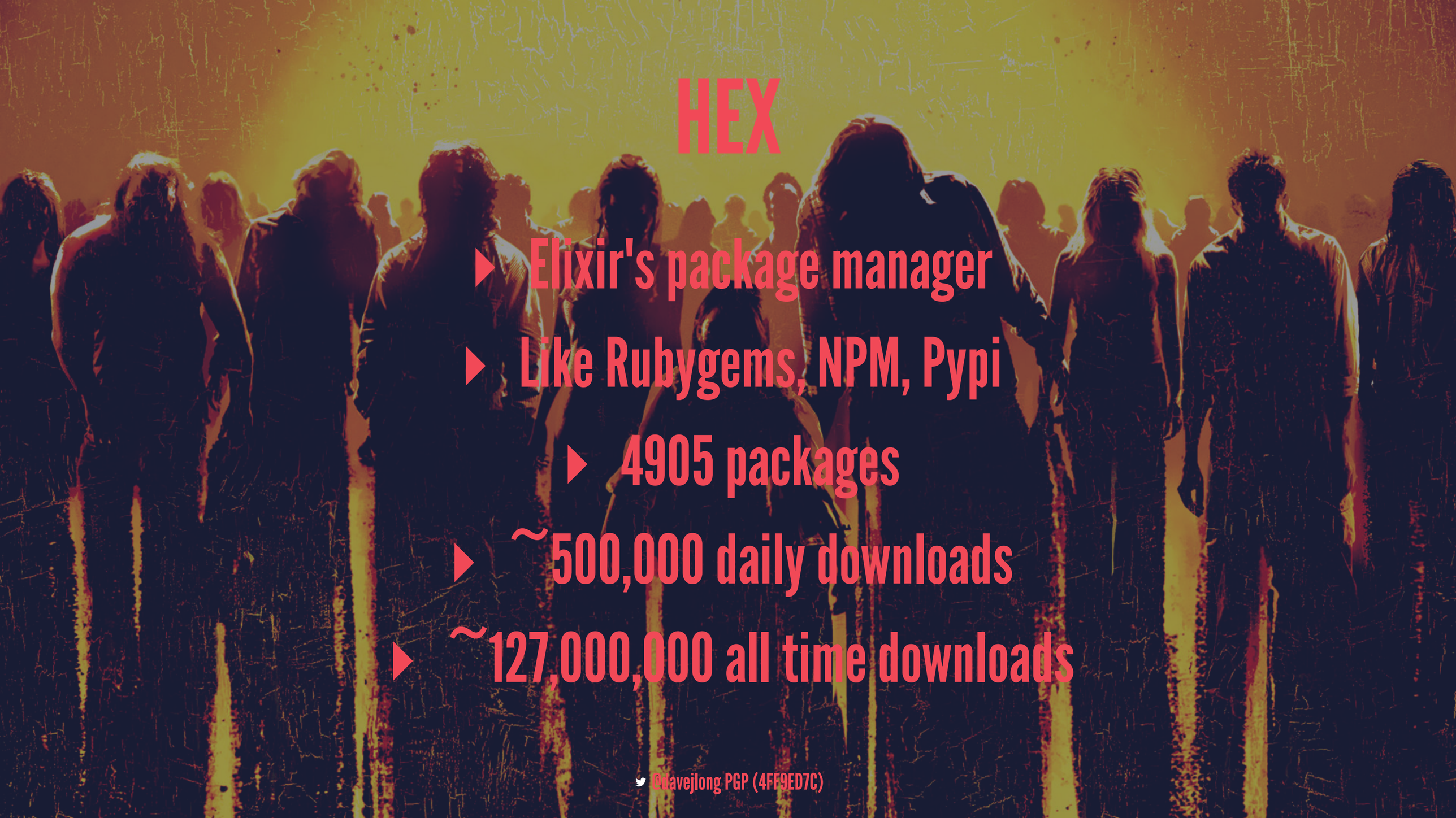
```
title # <= Top 3 Reasons To Love Zombies!
|> String.downcase
|> String.replace(~r/\W/, " ") # convert non-word chars (like -,!) into spaces
|> String.split               # drop extra whitespace
|> Enum.join("-")             # join words with dashes
```

OBJECT ORIENTED

```
title. # <= Top 3 Reasons To Love Zombies!
  downcase.
  gsub(/\W/, " "). # convert non-word chars (like -,!) into spaces
  split.           # drop extra whitespace
  join("-")        # join words with dashes
```

MIX

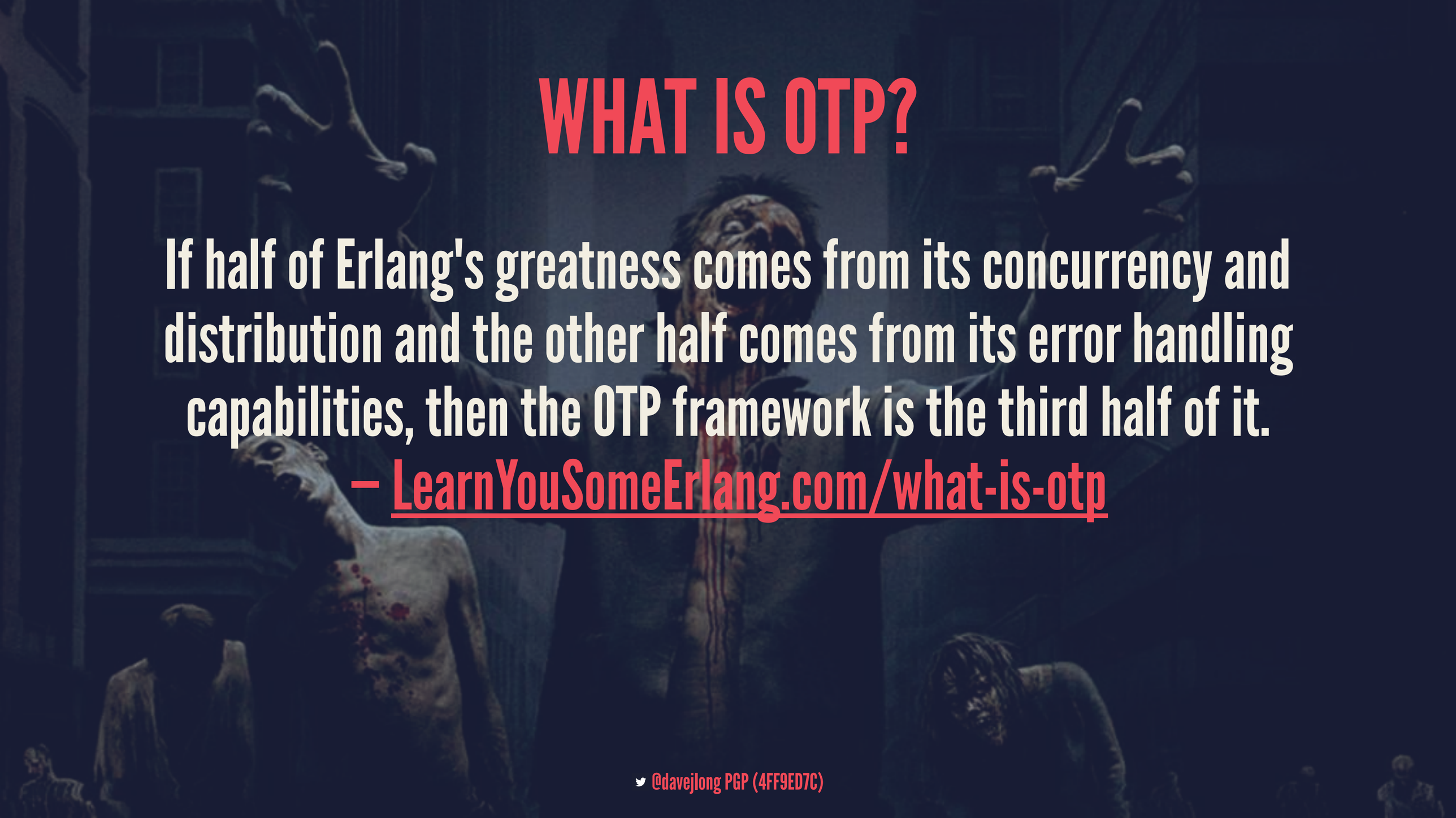
- Elixir's build tool
- Tasks for creating, compiling, testing applications
- Easy to extend
- Manages dependencies



HEX

- Elixir's package manager
- Like Rubygems, NPM, Pypi
- 4905 packages
- ~500,000 daily downloads
- ~127,000,000 all time downloads

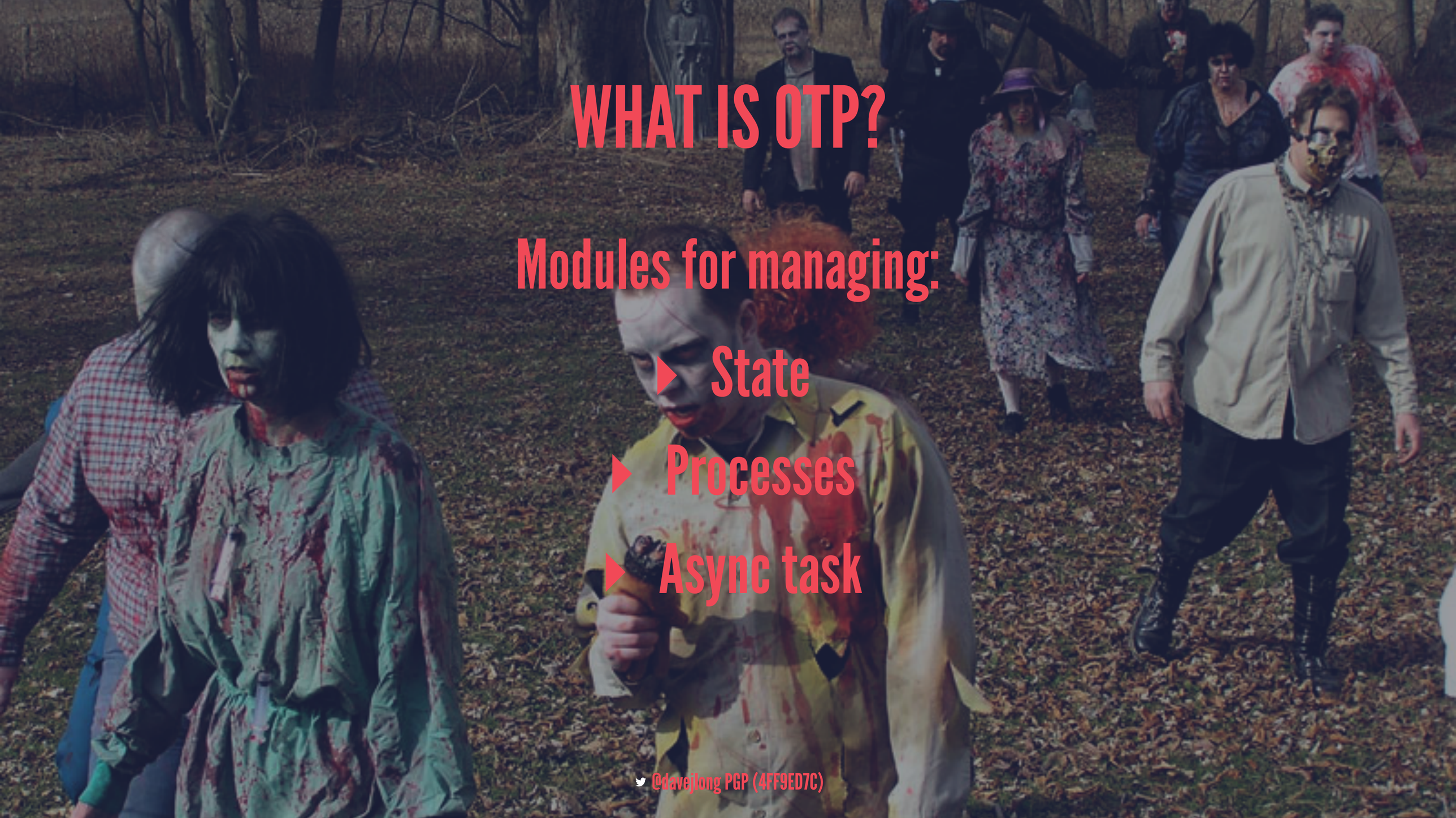
@davejlong PGP (4FF9ED7C)



WHAT IS OTP?

If half of Erlang's greatness comes from its concurrency and distribution and the other half comes from its error handling capabilities, then the OTP framework is the third half of it.

– LearnYouSomeErlang.com/what-is-otp



WHAT IS OTP?

Modules for managing:

- State
- Processes
- Async task

@davejlong PGP (4FF9ED7C)

AGENTS

SIMPLE STATE MANAGER

```elixir
defmodule Weapon do
  use Agent

  @initial 10

  def start_link(), do: Agent.start_link(fn -> @initial end, name: __MODULE__)

  def attack(task, project), do: Agent.update(__MODULE__, &(&1 - 1))

  def reload(), do: Agent.update(__MODULE__, fn -> @initial end)
end
```

```elixir
defmacro __using__(opts) do
  quote location: :keep, bind_quoted: [opts: opts] do
    spec = [
      id: opts[:id] || __MODULE__,
      start: Macro.escape(opts[:start]) || quote(do: {__MODULE__, :start_link, [arg]}),
      restart: opts[:restart] || :permanent,
      shutdown: opts[:shutdown] || 5000,
      type: :worker
    ]

    @doc false
    def child_spec(arg) do
      %{unquote_splicing(spec)}
    end

    defoverridable child_spec: 1
  end
end
```

AGENTS

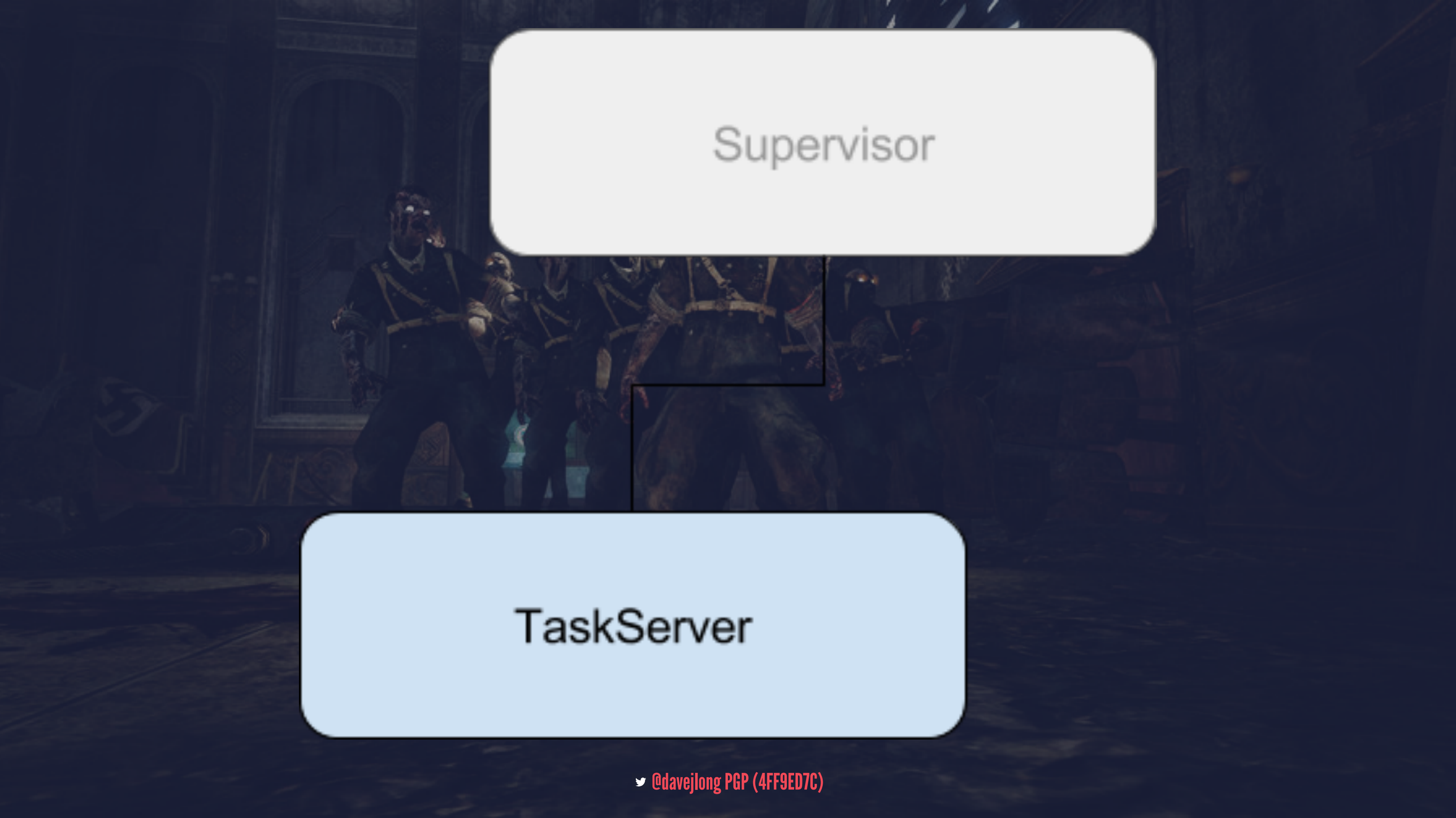
```elixir
defmodule Weapon do
  use Agent

  @initial 10

  def start_link(), do: Agent.start_link(fn -> @initial end, name: __MODULE__)

  def attack(task, project), do: Agent.update(__MODULE__, &(&1 - 1))

  def reload(), do: Agent.update(__MODULE__, fn -> @initial end)
end
```

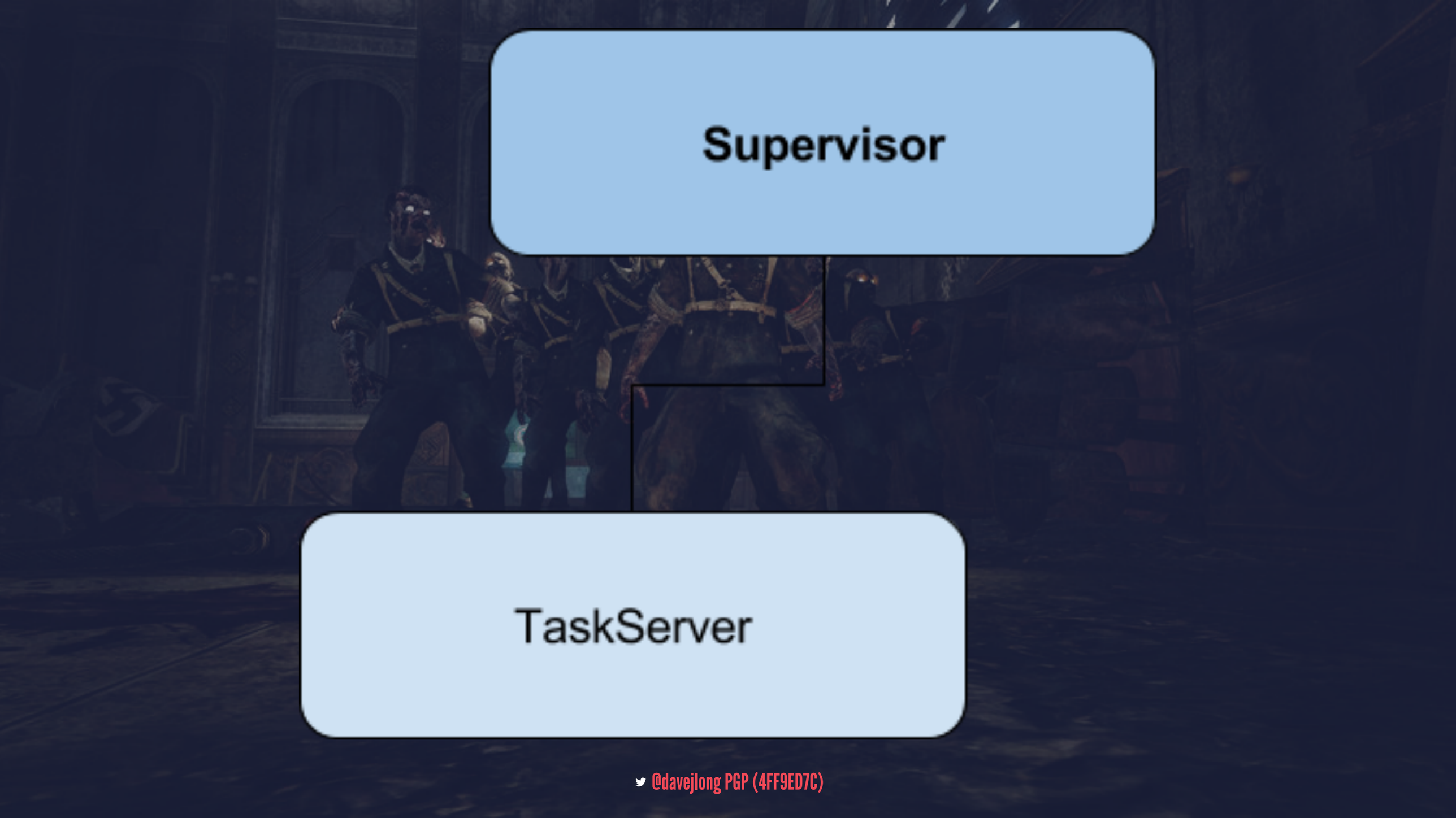
AGENTS

```elixir
defmodule Weapon do
  use Agent

  @initial 10

  def start_link(), do: Agent.start_link(fn -> @initial end, name: __MODULE__)

  def attack(task, project), do: Agent.update(__MODULE__, &(&1 - 1))

  def reload(), do: Agent.update(__MODULE__, fn -> @initial end)
end
```

AGENTS

```elixir
defmodule Weapon do
  use Agent

  @initial 10

  def start_link(), do: Agent.start_link(fn -> @initial end, name: __MODULE__)

  def attack(task, project), do: Agent.update(__MODULE__, &(&1 - 1))

  def reload(), do: Agent.update(__MODULE__, fn -> @initial end)
end
```


Supervisor
TaskServer


Supervisor
TaskServer

CREATING A SUPERVISOR

```
$ mix new walking_dead --sup

# lib/walking_dead/application.ex
defmodule WalkingDead.Application do
  use Application

  def start(_type, _args) do
    children = [
      Weapon.child_spec(nil)
    ]

    opts = [strategy: :one_for_one, name: MyApplication.Supervisor]
    Supervisor.start_link(children, opts)
  end
end
```

```elixir
# lib/walking_dead/application.ex
defmodule WalkingDead.Application do
  use Application

  def start(_type, _args) do
    children = [
      Weapon.child_spec(nil)
    ]

    opts = [strategy: :one_for_one, name: MyApplication.Supervisor]
    Supervisor.start_link(children, opts)
  end
end
```

```elixir
# lib/walking_dead/application.ex
defmodule WalkingDead.Application do
  use Application

  def start(_type, _args) do
    children = [
      Weapon.child_spec(nil)
    ]

    opts = [strategy: :one_for_one, name: MyApplication.Supervisor]
    Supervisor.start_link(children, opts)
  end
end
```

```elixir
# lib/walking_dead/application.ex
defmodule WalkingDead.Application do
  use Application

  def start(_type, _args) do
    children = [
      Weapon.child_spec(nil)
    ]

    opts = [strategy: :one_for_one, name: MyApplication.Supervisor]
    Supervisor.start_link(children, opts)
  end
end
```

```elixir
# lib/walking_dead/application.ex
defmodule WalkingDead.Application do
  use Application

  def start(_type, _args) do
    children = [
      Weapon.child_spec(nil)
    ]

    opts = [strategy: :one_for_one, name: MyApplication.Supervisor]
    Supervisor.start_link(children, opts)
  end
end
```

```elixir
# lib/walking_dead/application.ex
defmodule WalkingDead.Application do
  use Application

  def start(_type, _args) do
    children = [
      Weapon.child_spec(nil)
    ]

    opts = [strategy: :one_for_one, name: MyApplication.Supervisor]
    Supervisor.start_link(children, opts)
  end
end
```

RUNNING OUR APPLICATION

```
# mix.exs
defmodule WalkingDead.Mixfile do
  use Mix.Project

  def project do
    [...]
  end

  def application do
    [
      extra_applications: [:logger],
      mod: {WalkingDead.Application, []}
    ]
  end
end
```

RUNNING OUR APPLICATION

```
$ mix run --no-halt
```

RUNNING WITH REPL

```
$ iex -S mix run
```

WHAT IS TWILIO?

@davejlong PGP (4FF9ED7C)

WHAT IS TWILIO?

- API for Phone and SMS
- TaskRouter for communication workflows
- Two Factor Authentication Platform
- *APIs for Communication*

@davejlong PGP (4FF9ED7C)

@davejlong PGP (4FF9ED7C)

THE APPLICATION

- Zombies are invading
- World leaders need to trigger alerts
- People must be able to subscribe to get alerted


$ mix new zombie_alerter --sup

@davejlong PGP (4FF9ED7C)

@davejlong PGP (4FF9ED7C)


@davejlong PGP (4FF9ED7C)
AFP

QUESTIONS?

@davejlong PGP (4FF9ED7C)

SLIDES AND CODE AT
GITHUB.COM/DAVEJLONG/ZOMBIES

@davejlong PGP (4FF9ED7C)

THANK YOU

@davejlong PGP (4FF9ED7C)