Rocket

Sergio Benitez

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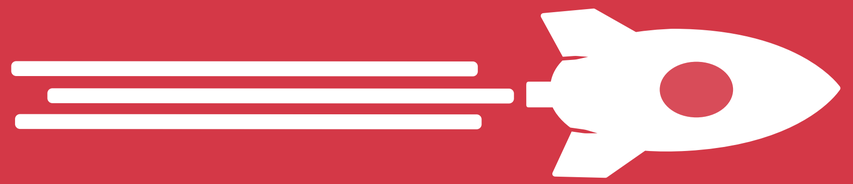

1. Introduction to Rocket

2. Code Generation in Rocket and Rust

3. What’s Next?

1 Introduction to Rocket

- Simple, Fast, Type-Safe Web Framework
- Powered by Rust's Code Generation Facilities
- Enables Secure, Robust Web Applications

2 Code Generation in Rocket and Rust

3 What's Next?

1 Introduction to Rocket

2 Code Generation in Rocket and Rust

- Demystifying the “Magic” of Code Generation
- Present and Future Code Generation APIs

3 What’s Next?

1 Introduction to Rocket

2 Code Generation in Rocket and Rust

3 What's Next?

- What's Coming in Future Versions of Rocket
- Code Generation at Large

1

Introduction to Rocket

Simple, Fast, Type-Safe Web Framework

2

Code Generation in Rocket and Rust

Demystifying the “Magic” of Code Generation

3

What’s Next?

What’s Coming in Future Versions of Rocket

1 Introduction to Rocket

Rocket is a web framework for Rust that makes it simple to write fast web applications without sacrificing flexibility or type safety.


☆2,670
Launch!
Dec. 23, 2016
v0.2
Feb. 06, 2017
v0.3
Jul. 14, 2017


in production
2,670
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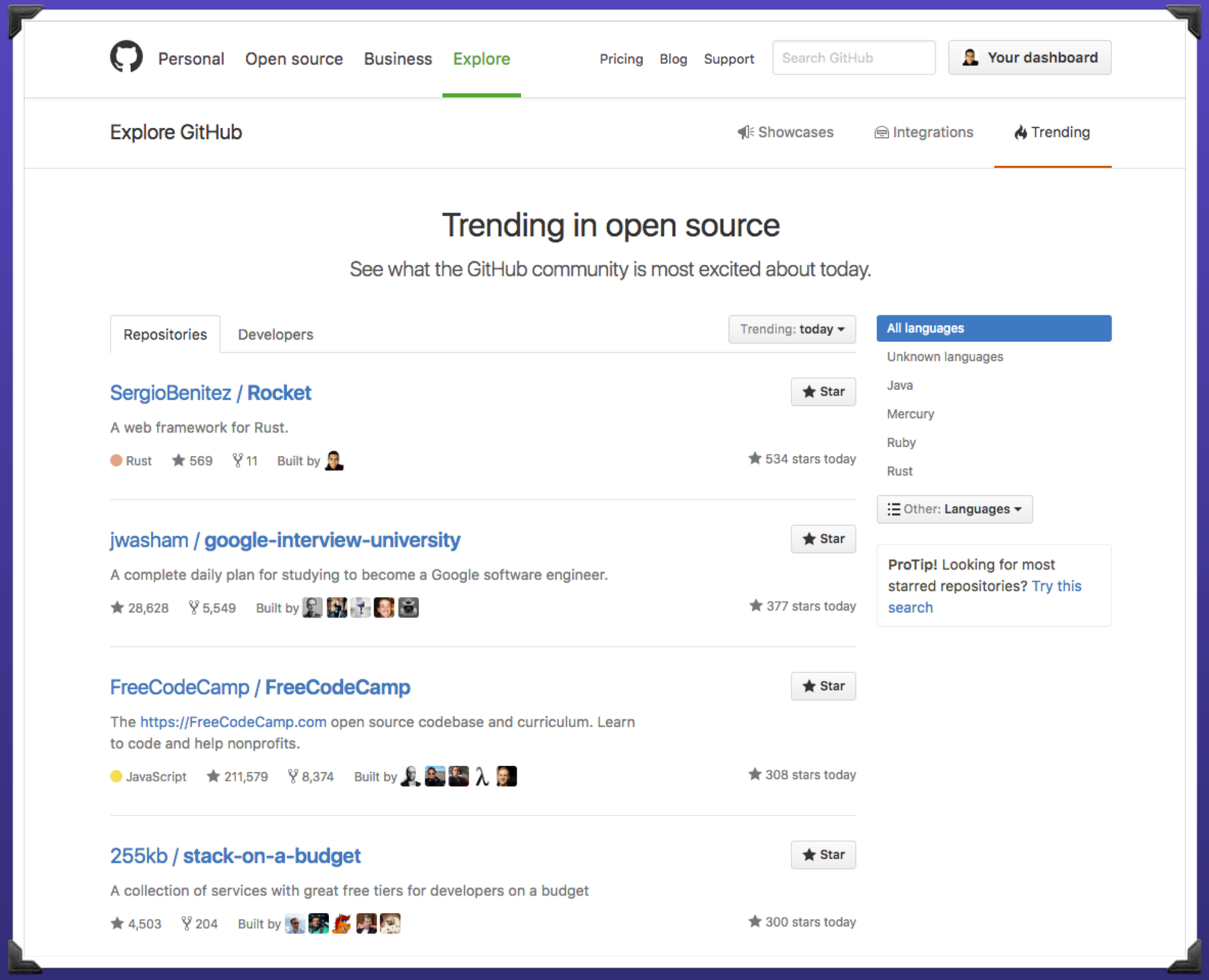
Personal
Open source
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Support
Search GitHub
Your dashboard
Explore GitHub
Showcases
Integrations
Trending
Trending in open source
See what the GitHub community is most excited about today.
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Developers
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SergioBenitez / Rocket
Star
A web framework for Rust.
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Early 2016

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Routes (Hello, world!)

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1 Route **Attribute:** Description of *matching* condition.

2 Route **Handler:** Request processing, produces response.

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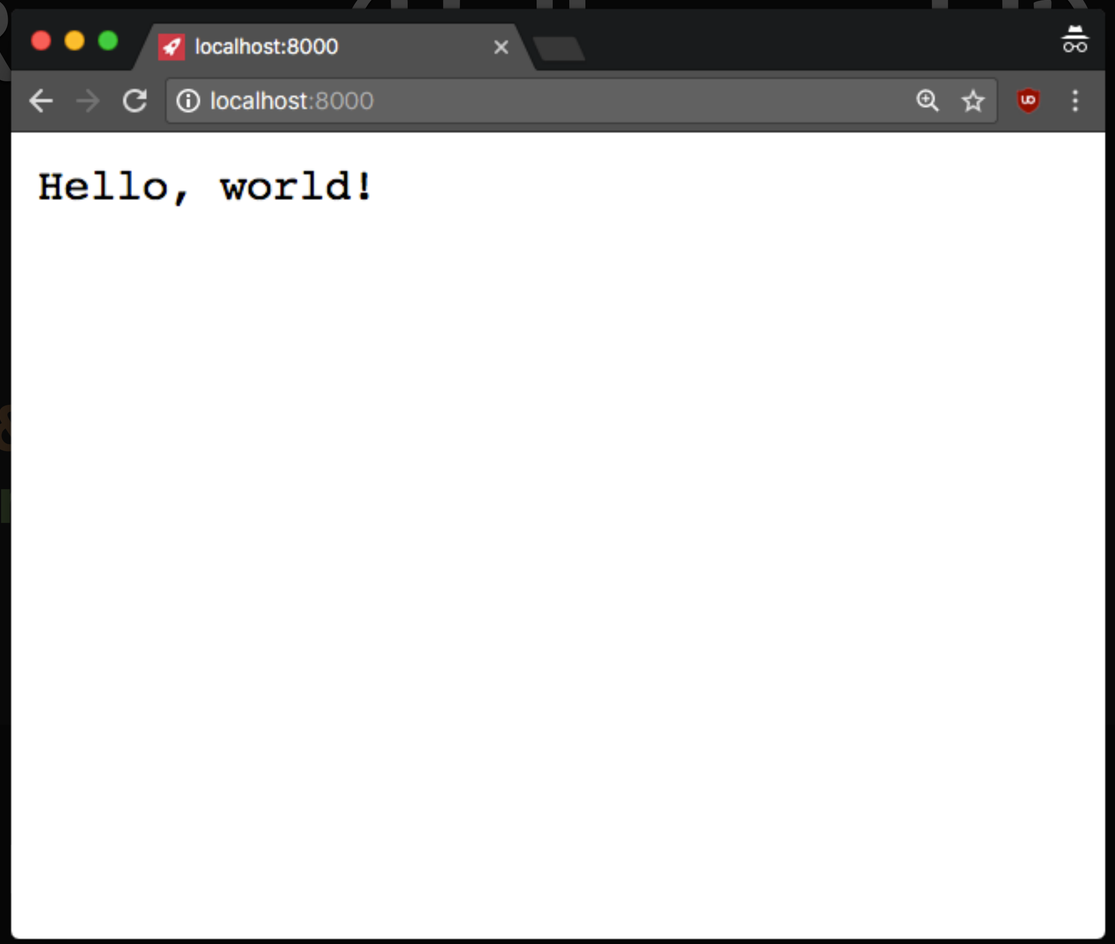
```



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2. Route **Handler:** Request processing, produces response.

Routes (Hello, world!)

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2. Route **Handler:** Request processing, produces response.

Mounting & Launching

```
1  #[get("/")]
2  fn hello() -> &'static str {
3      "Hello, world!"
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5
6  fn main() {
7      rocket::ignite().mount("/", routes![hello]).launch();
8  }
```

Routes need to be ***mounted*** to make Rocket aware.

Mounting & Launching

```
1  #[get("/")]
2  fn hello() -> &'static str {
3      "Hello, world!"
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```

Mounting *namespaces* routes according to a root path.

Mounting & Launching

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Launching starts up the server.

Mounting & Launching

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```

Launching starts up the server. (also prints emojis 🚀)

Mounting & Launching

```
🔧 Configured for development.
    => address: localhost
    => port: 8000
    => log: normal
    => workers: 16
    => secret key: generated
    => limits: forms = 32KiB
    => tls: disabled
🛰  Mounting '/':
    => GET / (hello)
🚀 Rocket has launched from http://localhost:8000
```

Launching starts up the server. (also prints emojis 🚀)

Mounting & Launching

```
1  #[get("/")]
2  fn hello() -> &'static str {
3      "Hello, world!"
4  }
5
6  fn main() {
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```

Mounting & Launching

```
1  #[get("/world")]
2  fn hello() -> &'static str {
3      "Hello, world!"
4  }
5
6  fn main() {
7      rocket::ignite().mount("/", routes![hello]).launch();
8  }
```

Mounting & Launching

```
1  #[get("/sergio")]
2  fn hello() -> &'static str {
3      "Hello, Sergio!"
4  }
5
6  fn main() {
7      rocket::ignite().mount("/", routes![hello]).launch();
8  }
```

Rocket is a web framework for Rust that makes it simple to write fast web applications without sacrificing flexibility or type safety.

Dynamic Paths

Dynamic Paths

Dynamic Paths

```
1  #[get("/<name>/<age>")]
2  fn hello(name: String, age: u8) -> String {
3      format!("Hello, {} year old named {}!", age, name)
4  }
```

Parameters in <brackets> **match *any* text in segment.**

Dynamic Paths

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1  #[get("/<name>/<age>")]
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Parameters in <brackets> match *any* text in segment.

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Dynamic Paths

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Parameters in <brackets> match *any* text in segment.

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Dynamic Paths

```
error: 'age' is declared as an argument...
 --> src/main.rs:9:16
  |
9 | #[get("/<name>/<age>")]
  |                ^^^^^

error: ...but isn't in the function signature.
  --> src/main.rs:10:1
   |
10 | / fn hello(name: String, number: u8) -> String {
11 | |     format!("Hello, {} year old named {}!", age, name)
12 | | }
   | |_^
```

Parameters i

- Name in <brackets> must have matching function argument.

Dynamic Paths

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Dynamic Paths

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4  }
```

Parameters in <brackets> match *any* text in segment.

- Type of dynamic parameter is declared in handler signature.
- *Any* type implementing `FromParam` is allowed.

Dynamic Paths

```
1  #[get("/<name>/<age>")]
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4  }
```

Parameters in <brackets> match *any* text in segment.

- Handler can only be called if `FromParam` conversion succeeds.

Preventing Directory Traversal

```
1  #[get("/<path..>")]
2  fn files(path: PathBuf) -> Option<NamedFile> {
3      NamedFile::open(Path::new("static/").join(path)).ok()
4  }
```

Implication: handlers are only called with validated data!

- `FromParam`* implementation for `PathBuf` verifies path safety.

Request Guards

Request Guards

```
1  #[get("/admin")]
2  fn admin_panel(admin: AdminUser) -> &'static str { ... }
```

Arbitrary number of `FromRequest` parameters allowed.

Request Guards

```
1  #[get("/admin")]
2  fn admin_panel(admin: AdminUser) -> &'static str { ... }
```

Request guards validate incoming request, protect handlers.

- Guards may *fail*, preventing further request processing.
- Guards may *forward*, indicating local failure.

Request Guards & Forwarding

```rust
#[get("/admin")]
fn admin_panel(admin: AdminUser) -> &'static str { ... }

#[get("/admin", rank = 2)]
fn admin_panel_user(user: User) -> &'static str { ... }
```

Forwarding: Rocket attempts *colliding* routes in ascending rank order.

Request Guards & Forwarding

```
1  #[get("/admin")]
2  fn admin_panel(admin: AdminUser) -> &'static str { ... }
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Request Guards & Forwarding

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Request Guards & Forwarding

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    => limits: forms = 32KiB
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🛰  Mounting '/':
    => GET /admin (admin_panel)
    => GET /admin (admin_panel_user)
Error: Rocket failed to launch due to the following routing collisions:
    => GET /admin (admin_panel) collides with GET /admin (admin_panel_user)
    => Note: Collisions can usually be resolved by ranking routes.
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#[get("/admin", rank = 3)]
fn admin_panel_redirect() -> Redirect { ... }
```

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Demystifying the “Magic” of Code Generation

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2 Code Generation in Rocket and Rust

Hello, World! *Revisited*

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6  fn main() {
7      rocket::ignite()
8          .mount("/", routes![hi])
9          .launch();
10 }
```

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}
```

```
static hi_info = RouteInfo {
    name: "hi",
    method: Method::Get,
    path: "/",
    handler: hi_route,
    format: None,
    rank: None,
};

fn hi_route(req: &Request) -> Outcome {
    let responder = hi();
    Outcome::from(req, responder)
}
..
.mount("/", vec![Route::from(&hi_info)])
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Guards & Params

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fn item(user: User, id: u32) {
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        Some(Ok(v)) => v,
        _ => return Outcome::Forward
    };

    let user_param: User = match User::from_request(req) {
        Outcome::Success(v) => v,
        Outcome::Forward(_) => return Outcome::Forward,
        Outcome::Failure(code) => return Outcome::Failure(code)
    };

    let responder = item(id_param, user_param);
    Outcome::from(req, responder)
}
```

Guards & Params

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    };

    let responder = item(id_param, user_param);
    Outcome::from(req, responder)
}
```

Code Generation

```
#[get("/item/<id>")]
fn item(user: User, id: u32) {
    ...
}
```

```
static item_info = RouteInfo { .. };
fn item_route(req: &Request) -> Outcome;
vec![Route::from(&item_info)]
```

- Static route information from route attribute.
- Monomorphized route handler from attribute and handler signature.
- Tied together through mounted structure.

Internals

Proc. Macro API

```
fn(Syntax) -> Syntax;
```

Proc. Macro API

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```

```
struct Syntax(Vec<TokenTree>);

struct TokenTree {
    node: TokenNode,
    span: Span
}
```

Proc. Macro API

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fn(Syntax) -> Syntax;
```

```
struct Syntax(Vec<TokenTree>);

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Proc. Macro API

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3 What’s Next?

Typed URIs

```
#[get("/<id>")]
fn retrieve(id: PasteId) -> Option<Plain<File>>> {
    let filename = format!("upload/{id}", id = id);
    File::open(&filename).map(|f| content::Plain(f)).ok()
}
```

Typed URIs

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#[get("/<id>")]
fn retrieve(id: PasteId) -> Option<Plain<File>>> {
    let filename = format!("upload/{id}", id = id);
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}
```

```
url!(retrieve: id = PasteId(100));
```

```
url!(retrieve: id = 100);
```

Typed URIs

```rust
#[get("/<id>")]
fn retrieve(id: PasteId) -> Option<Plain<File>>> {
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    File::open(&filename).map(|f| content::Plain(f)).ok()
}
```

```rust
url!(retrieve: id = PasteId(100));
```

```rust
url!(retrieve: id = 100);
```

```
"/100"
```

Database Support

Today

```
type Pool = r2d2::Pool<ConnectionManager<SqliteConnection>>;

static DATABASE_URL: &'static str = env!("DATABASE_URL");

fn init_pool() -> Pool {
    let config = r2d2::Config::default();
    let manager = ConnectionManager::<SqliteConnection>::new(DATABASE_URL);
    r2d2::Pool::new(config, manager).expect("db pool")
}

pub struct DbConn(pub r2d2::PooledConnection<ConnectionManager<SqliteConnection>>);

impl<'a, 'r> FromRequest<'a, 'r> for DbConn {
    type Error = ();

    fn from_request(request: &'a Request<'r>) -> request::Outcome<DbConn, ()> {
        let pool = request.guard::<State<Pool>>()?;
        match pool.get() {
            Ok(conn) => Outcome::Success(DbConn(conn)),
            Err(_) => Outcome::Failure((Status::ServiceUnavailable, ()))
        }
    }
}
```

In Rocket v0.4

Rocket.toml

```toml
[[database]]
name = "my_db"
adapter = "diesel_sqlite"
```

main.rs

```rust
#[derive(DbConn)]
#[database("my_db")]
struct DbConn(SqliteConnection);
```

3 What’s Next?

1

Introduction to Rocket

Simple, Fast, Type-Safe Web Framework

2

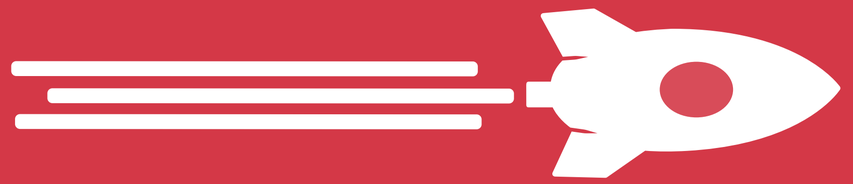
Code Generation in Rocket and Rust

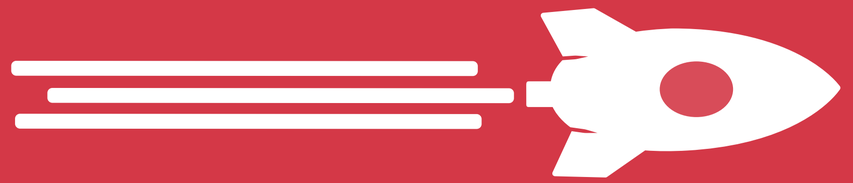
Demystifying the “Magic” of Code Generation

3

What’s Next?

What’s Coming in Future Versions of Rocket





myths

Too Much “Magic”

~~Too Much “Magic”~~

Unstable

~~Unstable~~

Forever on Nightly

~~Forever on Nightly~~

Rocket

https://rocket.rs

guide, tutorial, docs, news, code

Sergio Benitez

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