Functional programming @ Avast

Jenda Kolena

Scala dev, Avast Threat Labs

About Avast

Cyber-security software company, started and still headquartered in Prague.

One of the biggest AV companies in the world.

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Many teams in Avast do FP, mostly in Scala.

More about Scala

Hybrid of Java, Haskell and ML - fusion of OOP and FP.

Powerful type system - comparable to Haskell.

Runs on JVM - interoperability with Java, Kotlin, Groovy, ...

More about Scala

Type-classes.

Immutable data classes - case classes.

Pattern matching.

For-comprehension == do-notation.

Avast Scala

Purely functional programming (we try).

Monix library - asynchronous programming, separation of side-effects.

Cats library - Functor, Monad, etc., advanced syntax

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We are the biggest Scala employer in Prague.

Probably even in whole Czechia.

Threat Labs

We are the core department of antivirus company.

We do malware research and develop supporting systems.

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SCAVENGER

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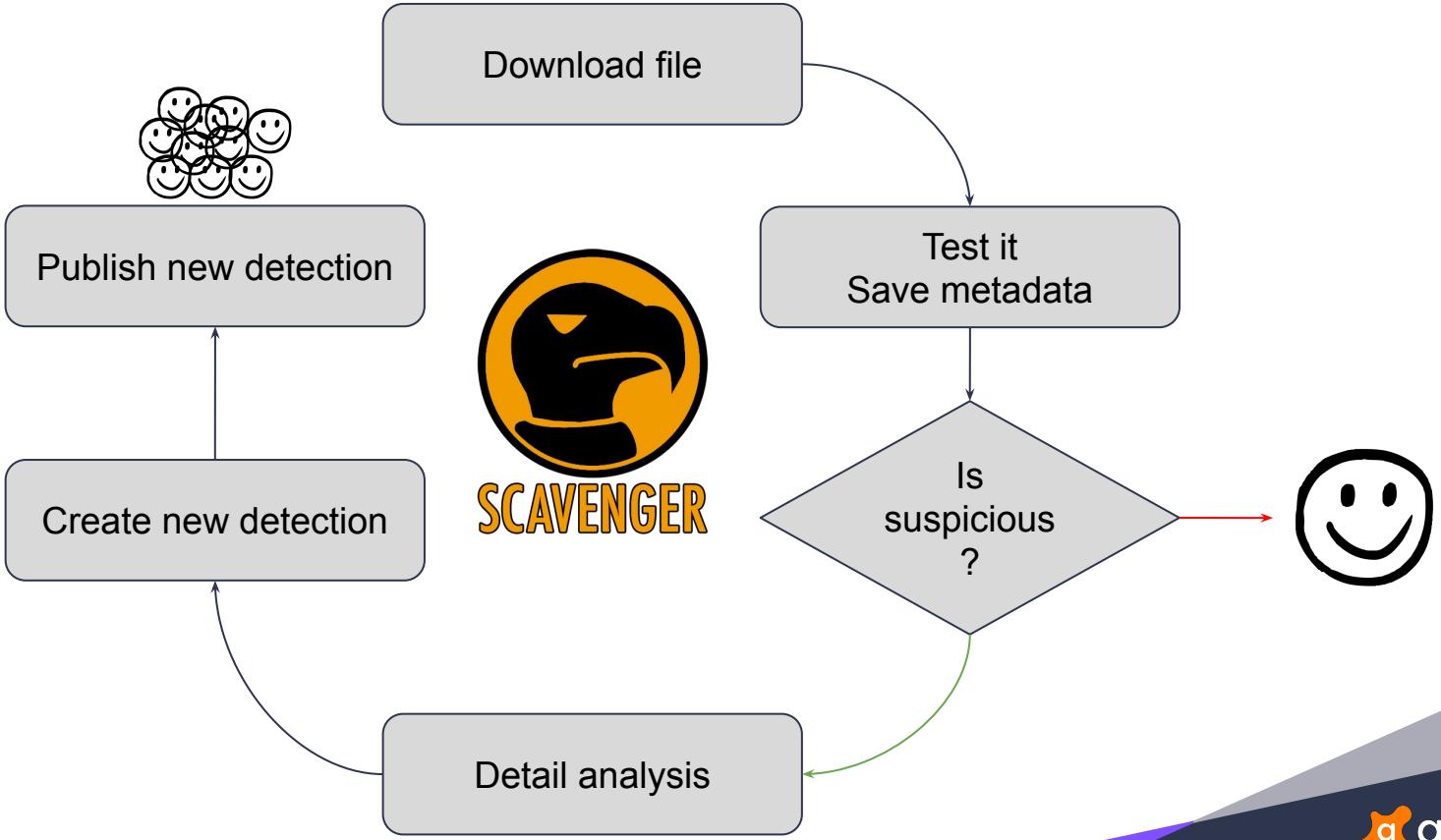
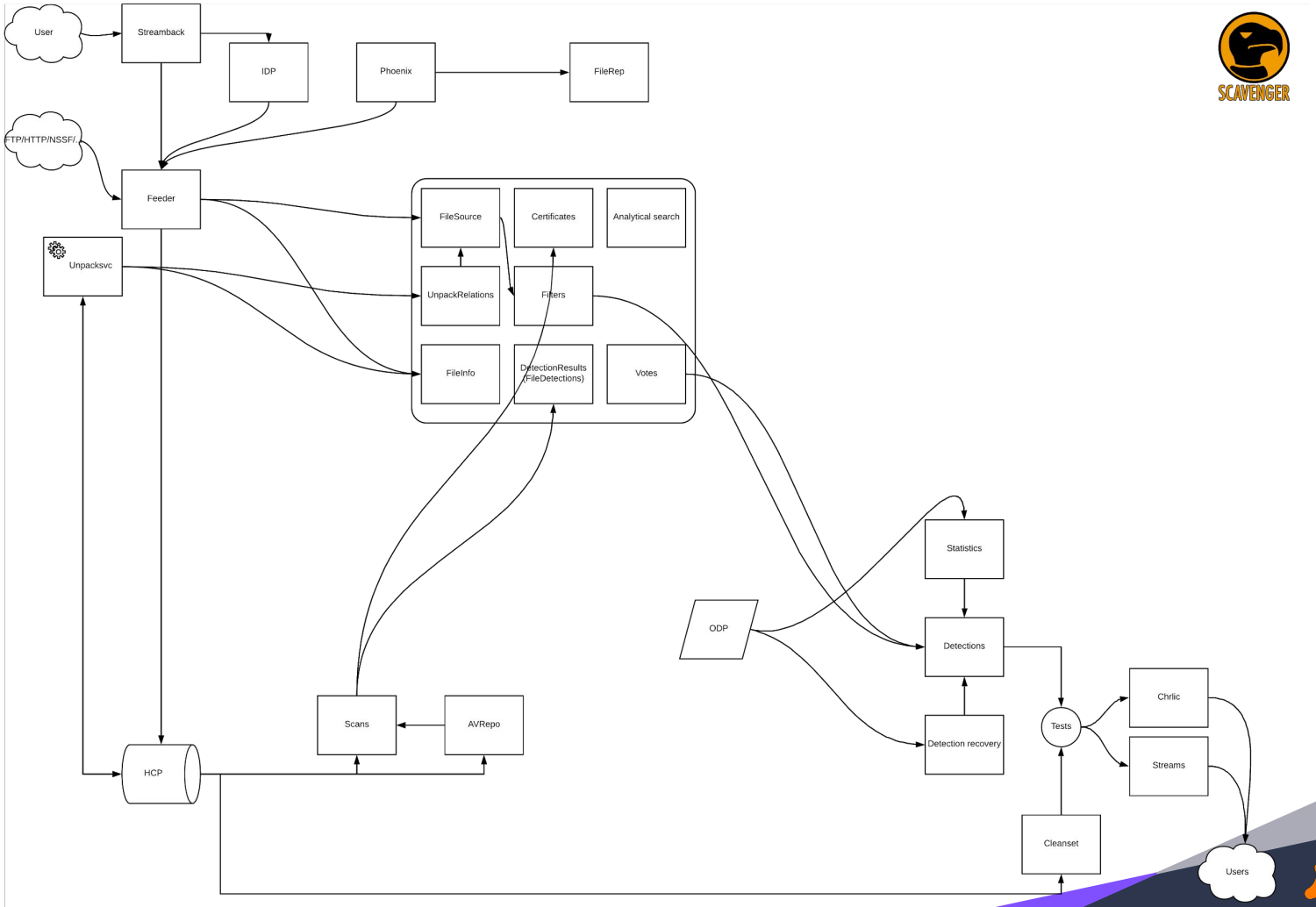
Threat Labs is a virus laboratory.



We run a number of reactive microservices.

Written in Scala. And Python. And Perl.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HCP
Cleanset
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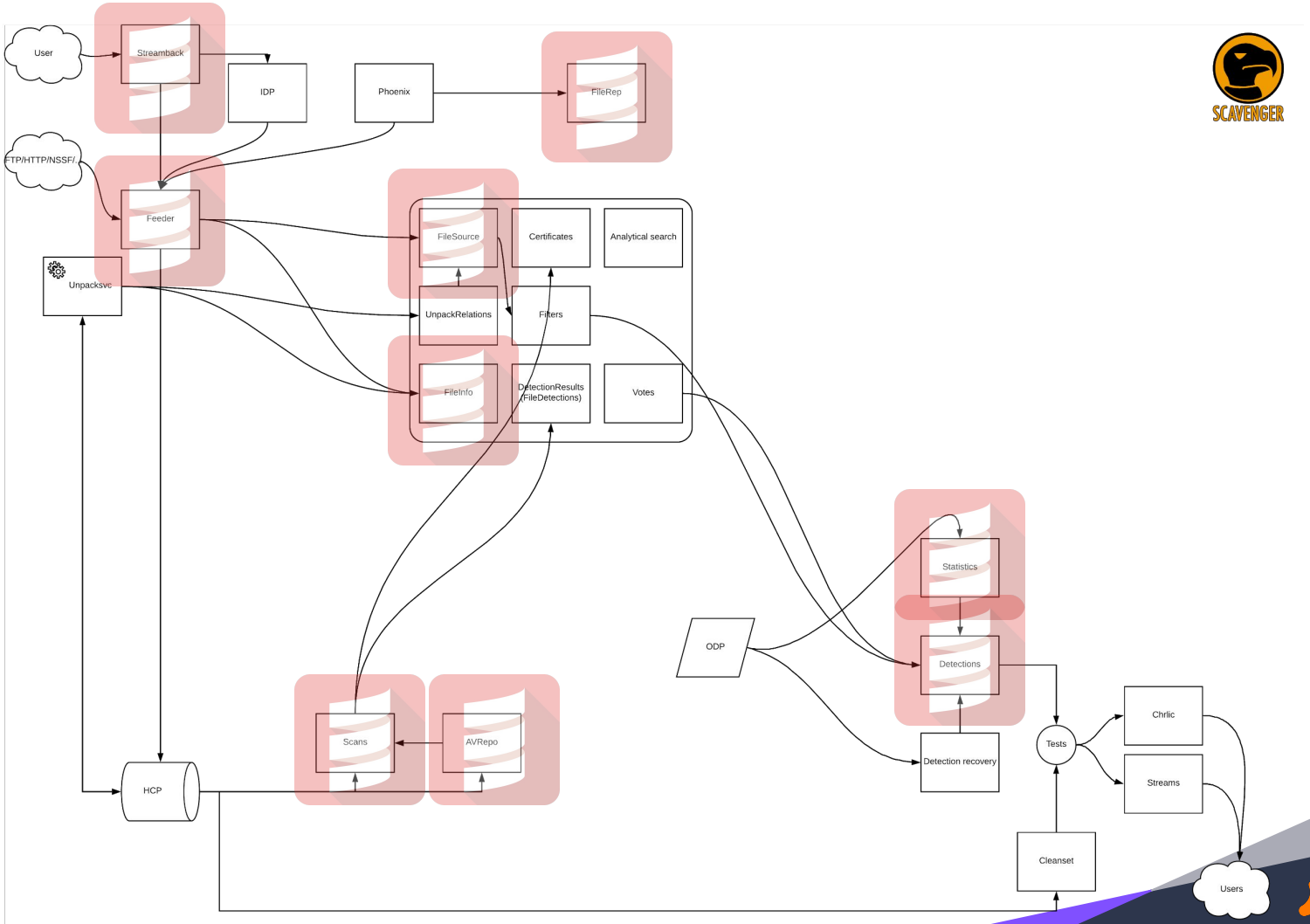
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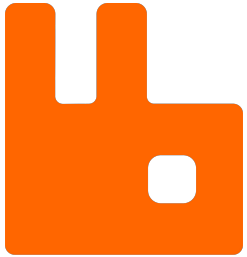
We use gRPC and RabbitMQ for inter-service communication.



RabbitMQ

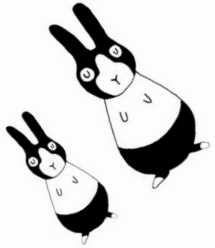
```scala
object RabbitMqConfiguration extends TaskLogging {
  def apply(rabbitEc: ExecutorService, config: Config, monitor: Monitor): Task[Unit] = {

    val rabbitConnection: Task[DefaultRabbitMQConnection[Task]] = {
      RabbitMQConnection.fromConfig[Task](config.getConfig( path = "rabbit"), rabbitEc)
    }

    def consumer(rabbitConnection: RabbitMQConnection[Task]): Task[RabbitMQConsumer[Task]] = {
      rabbitConnection
        .newConsumer( configName = "fileDataConsumer", monitor.named( name = "consumer")) {
          case Delivery.Ok(body, properties, routingKey) =>
            logger.debug(s"Received: $body, $properties, $routingKey") >>
              Task.pure(DeliveryResult.Ack)

          case Delivery.MalformedContent(_, _, _, exception) =>
            logger.warn( message = "Error while receiving event", exception) >>
              Task.pure(DeliveryResult.Reject)
        }
    }

    for {
      conn <- rabbitConnection
      _ <- consumer(conn)
    } yield ()
  }
}
```



gRPC

```
service ExampleService {
    rpc AddFileData(AddFileDataParams) returns (google.protobuf.Empty) {
        option (roles) = "Admin";
        option (roles) = "Analyst";
    }
    rpc GetFileData(GetFileDataParams) returns (GetFileDataResult) {}
}

message AddFileDataParams {
    bytes file_id = 1;
    string data = 2;
}

message GetFileDataParams {
    bytes file_id = 1;
}

message GetFileDataResult {
    repeated FileData file_data = 1;
}

message FileData {
    bytes file_id = 1;
    string data = 2;
}
```

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gRPC

```
trait ExampleServiceClient[F[_]] extends GrpcClient {
  def addFileData(fs: FileData): F[ServerResponse[Unit]]

  def getFileData(f: Sha256): F[ServerResponse[Seq[FileData]]]
}
```

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We run services in Kubernetes cluster.

kubernetes

LUFT

Declarative deployment.

Infrastructure as a code.

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Q&A