AWS Java Bootstrap

...or AWS for Java Developers

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"It's not work if you like it"
…so I never worked. #java

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#210 The Cloud is Slower Than Your Local Machine

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#185 A Cloud Migration Story: From J2EE to Serverless Java

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ZX Spectrum
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the cloud ha

#202 AWS Lambda, Events, Quarkus and Java

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An airhacks.fm conversation with Goran Opacic (@goranopacic) about:

transactions and clouds, checkout last episode with Goran: "#190 Real World Enterprise Serverless Java on AWS Cloud", transition from Java EE to the cloud, Long Running Actions in MicroProfile and the saga pattern, the problem of transaction coordination, in the clouds there should be no coordinating servers, DynamoDB is transactional and supports conditional writes, AWS Lambda Powertools for Java, event driven thinking on AWS, Java idioms and conventions on AWS, Amazon DynamoDB JPA-like persistence - DynamoDBMapper, dependency injection in AWS Lambdas, AWS Lambda PowerTools features should become a part of Lambda, the Z Garbage Collector, a missile with memory leaks, running BIRT reports in a AWS Lambda, synchronous Step Functions, EventBridge is the service connectors, AWS AppSync can push events to the client,

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with the time machine, “100 episodes ago segment”

…any questions left?

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“Lieferkettensorgfaltspflichtengesetz (LkSG)”

“Lieferkettensorgfaltspflichtengesetz (LkSG)”

“The German government has set itself the goal of protecting human rights and the environment along the supply chains of companies operating in Germany. From 2023, companies with 3,000 or more employees are also required by law to introduce a risk management system for suppliers. From 2024, the law will apply to companies with 1,000 or more employees.

The risk management system should help to assess, mitigate and monitor the human rights and environmental risks in your supply chain. The reporting obligation to the German authorities begins in April 2024 at the latest.”

(translated)

“Lieferkettensorgfaltspflichtengesetz (LkSG)”

“Die deutsche Bundesregierung hat sich zum Ziel gesetzt, die Menschenrechte und die Umwelt entlang der Lieferketten der in Deutschland tätigen Unternehmen zu schützen. Ab 2023 sind Unternehmen ab 3.000 Beschäftigten laut Gesetz zudem zur Einführung eines Risikomanagementsystems für Lieferanten verpflichtet. Ab 2024 gilt das Gesetz dann schon für Unternehmen ab 1.000 Beschäftigten.

Das Risikomanagementsystem soll dazu beitragen, die menschenrechtlichen und umweltbezogenen Risiken in Ihrer Lieferkette zu bewerten, abzumildern und zu überwachen. Die Berichtspflicht gegenüber den deutschen Behörden beginnt spätestens im April 2024.”

https://www.sap.com/germany/products/spend-management/lksg.htm

java …in the clouds?

Green IT

Green IT

Total

	Energy
(c) C	1.00
(c) Rust	1.03
(c) C++	1.34
(c) Ada	1.70
(v) Java	1.98
(c) Pascal	2.14
(c) Chapel	2.18
(v) Lisp	2.27
(c) Ocaml	2.40
(c) Fortran	2.52
(c) Swift	2.79
(c) Haskell	3.10
(v) C#	3.14
(c) Go	3.23
(i) Dart	3.83
(v) F#	4.13
(i) JavaScript	4.45
(v) Racket	7.91
(i) TypeScript	21.50
(i) Hack	24.02
(i) PHP	29.30
(v) Erlang	42.23
(i) Lua	45.98
(i) Jruby	46.54
(i) Ruby	69.91
(i) Python	75.88
(i) Perl	79.58

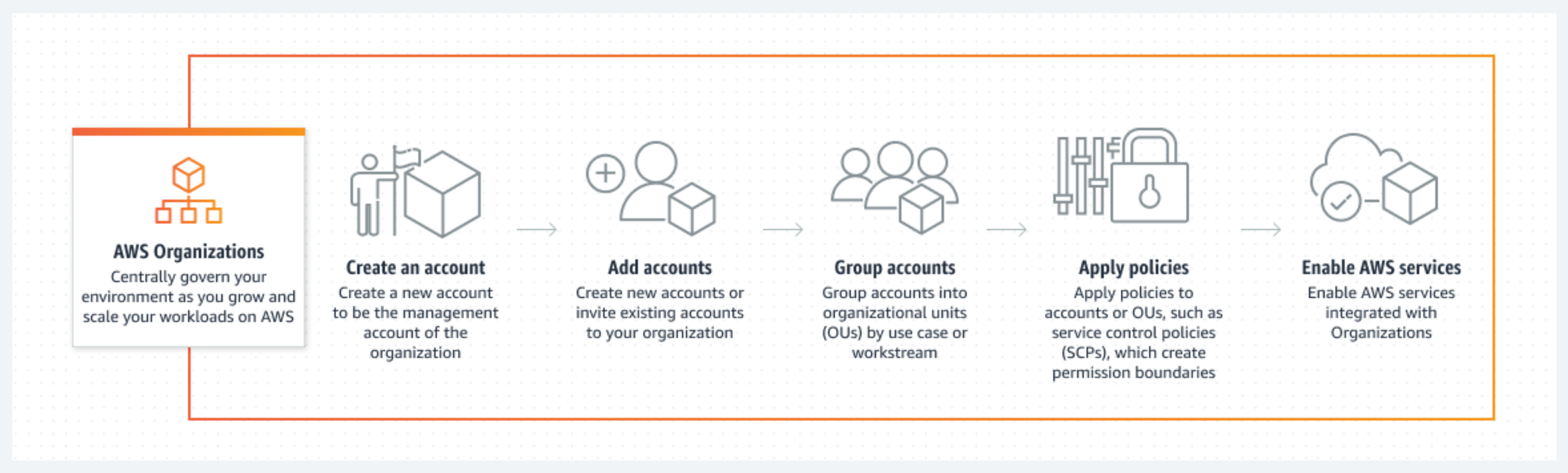
	Time
(c) C	1.00
(c) Rust	1.04
(c) C++	1.56
(c) Ada	1.85
(v) Java	1.89
(c) Chapel	2.14
(c) Go	2.83
(c) Pascal	3.02
(c) Ocaml	3.09
(v) C#	3.14
(v) Lisp	3.40
(c) Haskell	3.55
(c) Swift	4.20
(c) Fortran	4.20
(v) F#	6.30
(i) JavaScript	6.52
(i) Dart	6.67
(v) Racket	11.27
(i) Hack	26.99
(i) PHP	27.64
(v) Erlang	36.71
(i) Jruby	43.44
(i) TypeScript	46.20
(i) Ruby	59.34
(i) Perl	65.79
(i) Python	71.90
(i) Lua	82.91

	Mb
(c) Pascal	1.00
(c) Go	1.05
(c) C	1.17
(c) Fortran	1.24
(c) C++	1.34
(c) Ada	1.47
(c) Rust	1.54
(v) Lisp	1.92
(c) Haskell	2.45
(i) PHP	2.57
(c) Swift	2.71
(i) Python	2.80
(c) Ocaml	2.82
(v) C#	2.85
(i) Hack	3.34
(v) Racket	3.52
(i) Ruby	3.97
(c) Chapel	4.00
(v) F#	4.25
(i) JavaScript	4.59
(i) TypeScript	4.69
(v) Java	6.01
(i) Perl	6.62
(i) Lua	6.72
(v) Erlang	7.20
(i) Dart	8.64
(i) Jruby	19.84

https://sites.google.com/view/energy-efficiency-languages/results?authuser=0

AWS Organizations

AWS Organizations



https://aws.amazon.com/organizations/

AWS IAM Identity Center

AWS IAM Identity Center

https://aws.amazon.com/iam/identity-center/

IaC

Infrastructure as Code

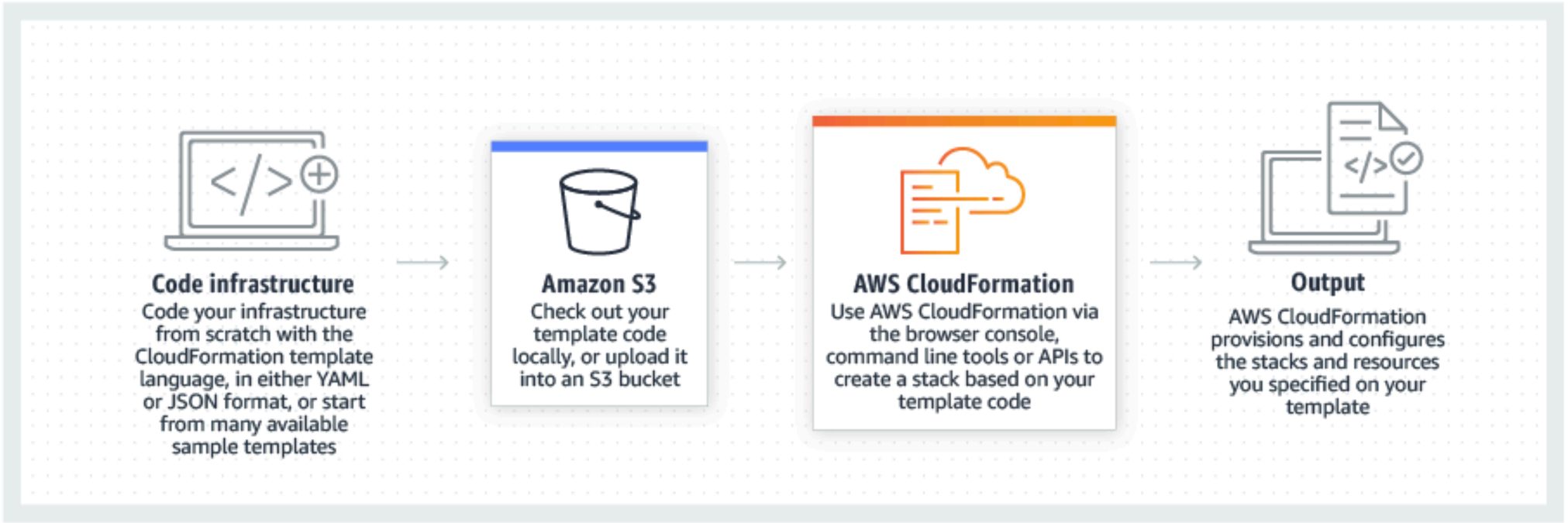
Infrastructure as code (**IaC**) is the process of managing and provisioning computer data centers through machine-readable definition files, rather than physical hardware configuration or interactive configuration tools.[1] The IT infrastructure managed by this process comprises both physical equipment, such as bare-metal servers, as well as virtual machines, and associated configuration resources. The definitions may be in a version control system. It can use either scripts or declarative definitions, rather than manual processes, but the term is more often used to promote declarative approaches.

https://en.wikipedia.org/wiki/Infrastructure_as_code

Infrastructure as Code

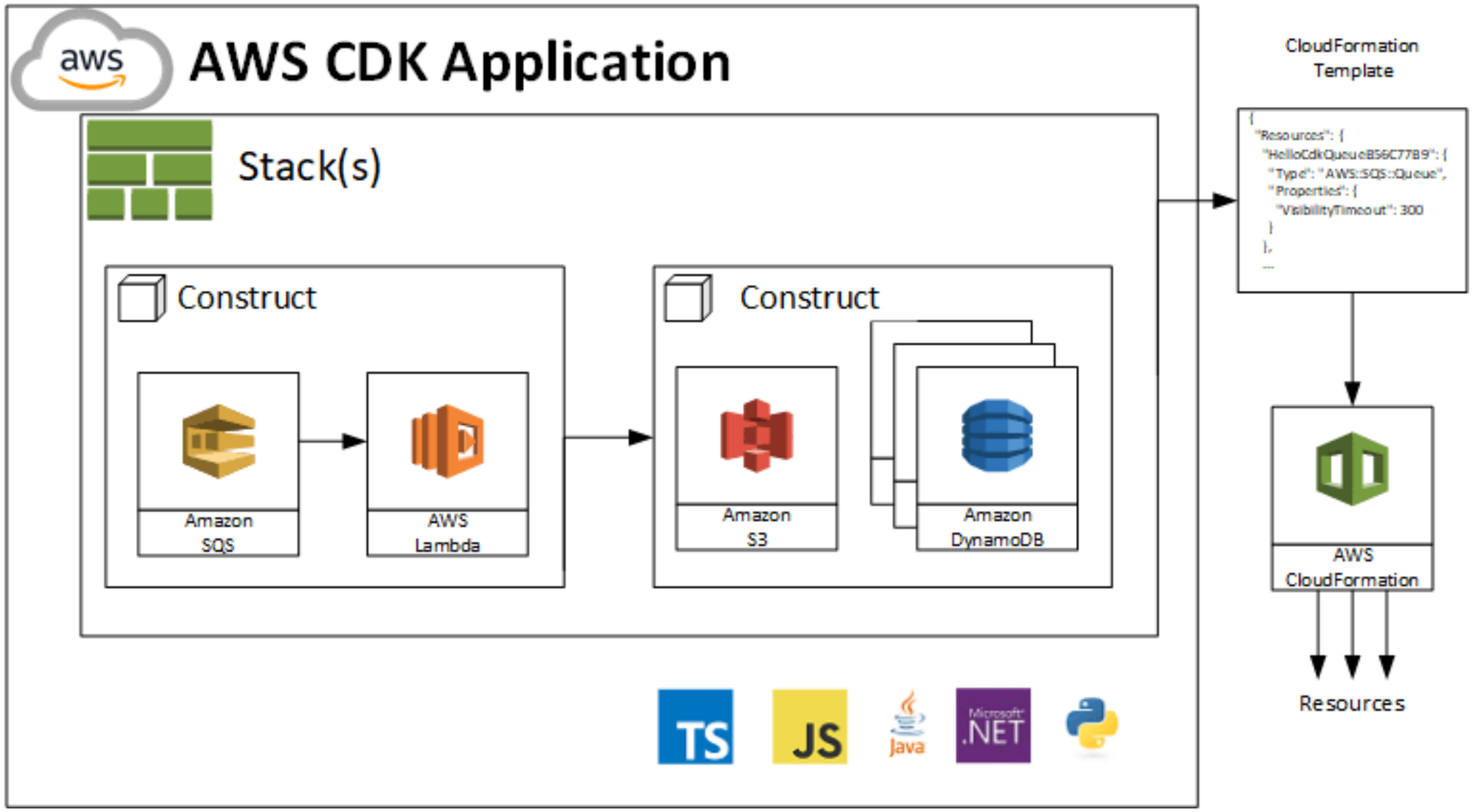
- AWS Command Line Interface (CLI)
- AWS CloudFormation
- AWS Cloud Development Kit (AWS CDK)

AWS CloudFormation



https://aws.amazon.com/cloudformation/

AWS Cloud Development Kit (CDK)



https://docs.aws.amazon.com/cdk/latest/guide/home.html

Constructs

- L1: Cfn resources
- L2: opinionated resources
- L3: patterns - composite resources
- **custom constructs**

Infrastructure as Code

- “cloud api” integration
- tables, queues and objects are exposed as AWS “Resources”
- no side channels required
- easier IaC
- multi-tenancy out-of-the-box
- integrated authentication and authorization

IAM

AWS Identity and Access Management

- users
- groups
- roles
- policy
- resources
- identities
- permissions

sample policy

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Sid": "ListObjectsInBucket",
            "Effect": "Allow",
            "Action": "s3:ListBucket",
            "Resource": ["arn:aws:s3:::bucket-name"]
        },
        {
            "Sid": "AllObjectActions",
            "Effect": "Allow",
            "Action": "s3:*Object",
            "Resource": ["arn:aws:s3:::bucket-name/*"]
        }
    ]
}
```

networking

networking

- VPC
- global infrastructure
- region
- AZ
- CIDR
- subnet

networking

- VPC peering
- Transit gateway
- VPC Endpoints
  - Interface Endpoint (VPC PrivateLink, same region)
  - Gateway Endpoints: used by S3 and DynamoDB (routing)

networking

- Amazon Route 53
- AWS Certificate Manager (ACM)
- Amazon CloudFront
- AWS Global Accelerator
- Security Groups
- NACLs

VPC

- default VPC
- CIDR ranges (5 IP addresses are reserved)
  - 10.0.0.0/16
  - 172.31.0.0/16
  - 192.168.0.0/16

compute

compute

- EC 2, ELB
- ECS, ECR
- ECS, EKS Fargate
- AWS App Runner
- Amazon Lightsail
- AWS Lambda
- AWS Outposts

storage

storage

- block vs. object storage
- elasticity
- availability
- durability
- consistency
- performance, especially latency
- access protocol (http, mounting)

storage

- S3
- instance storage
- EBS
- EFS
- RDS, Redshift
- Aurora
- DynamoDB, Athena, Neptune

S3

S3

- serverless
- Erasure Coding
- paralellization
- Byte-range GETs
- Storage Classes / Lifecycle
- Object size: <5 TB

S3

- 99.99% availability (depends on storage class)
- 99.999999999% (11 9’s) durability
- blocking commit at > 3 AZ, multiple servers
- strong read-after-write consistency
- versioning available

S3

- event notifications / Event Bridge integration
- S3 Transfer Accelaration
- data access auditing
- SSE-S3, SSE-C, SSE-KMS encryption
- VPC endpoints

S3

- access points
- “Query in Place”
- static website hosting
- inter / intra region replication
- glacier archival

databases

databases

- SQL or NoSQL
- key value
- document
- backup
- maintenance

Aurora Serverless

aurora serverless

- v2: min 0.5 ACU
- replication to 3 AZs
- 6 copies
- continuous S3 backup
- 15 read replicas
- fast snapshots

aurora serverless

- global database
- maintenance windows / pending boots
- self-healing storage
- DB restart < 60s
- slow provisioning
- DB internals are not considered as Resource
- Multi Master is available

DynamoDB

DynamoDB

- serverless
- key-value store
- ACID transactions are available
- Java’s Map-like persistence
- DB objects are resources
- IAM integration

DynamoDB

- Availability 99.999% vs 99.99%
- Three copies are stored across AZs
- Backup / Restore
- IA Tables
- PartiQL
- PITR (incremental for 35 days)

Kinesis

Kinesis (2013)

- partition keys
- shard input (1MB/s) 1000 Records/s
- shard output (2MB/s) 1000 Records/s
- retention 24h - 7days (long term 365days)
- replay available
- similar to kafka

Kinesis

- Shared vs. Enhanced Fan-Out (lower latency)
- SubscribeToShard (HTTP/2) ~70ms (enhanced fan-out only)
- on-demand vs. provisioned mode

MSK

MSK

- Apache Kafka - Managed or Serverless
- Topics
- Kafka Streams
- KSQLDB
- topics / server are configured via Kafka API - no IaC / CDK support

Amazon Event Bridge

Amazon Event Bridge

- serverless event bus
- “Serverless Event Router”
- JSON messages as payloads
- message / event transformations
- integrated with S3, CodeBuild, AWS Lambda

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Thank You!