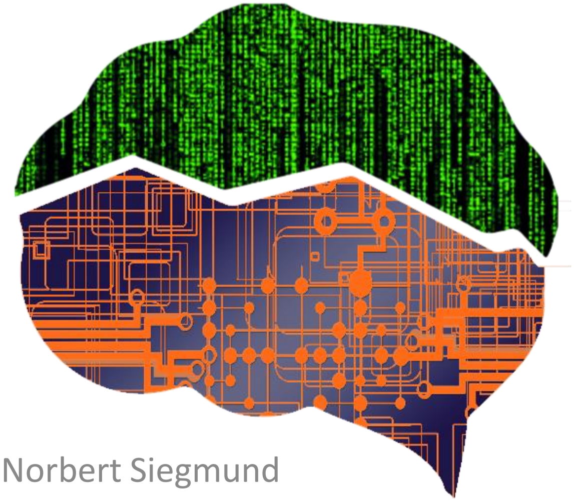
Modern Software Technologies

Introduction and Motivation



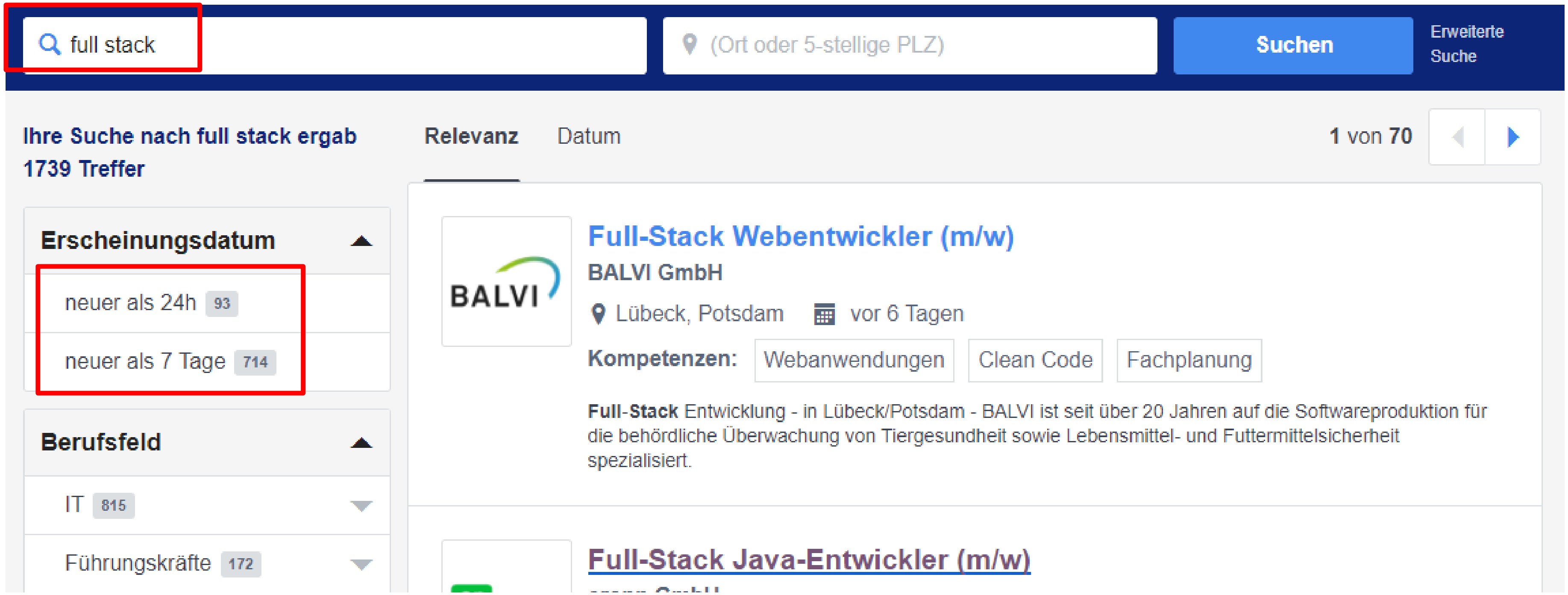
Prof. Dr.-Ing. Norbert Siegmund
Intelligent Software Systems

Bauhaus-Universität
Weimar

What this Course is About

- You will learn state of the art software technologies, such as
  - Docker, Continuous integration, MicroServices, Vue.js, etc-
- You will apply these techniques in a real-world software project
  - Digitize the registration for the Ferienpass-Weimar.de
- You will work with a real IT-Consultant and have real-world deadlines, etc.
- You will learn how to present the acquired skills

Topics: Full Stack Java Developer



Ihre Suche nach full stack ergab 1739 Treffer

Erscheinungsdatum

- neuer als 24h 93
- neuer als 7 Tage 714

Berufsfeld

- IT 815
- Führungskräfte 172

Full-Stack Webentwickler (m/w)

BALVI GmbH

Lübeck, Potsdam — vor 6 Tagen

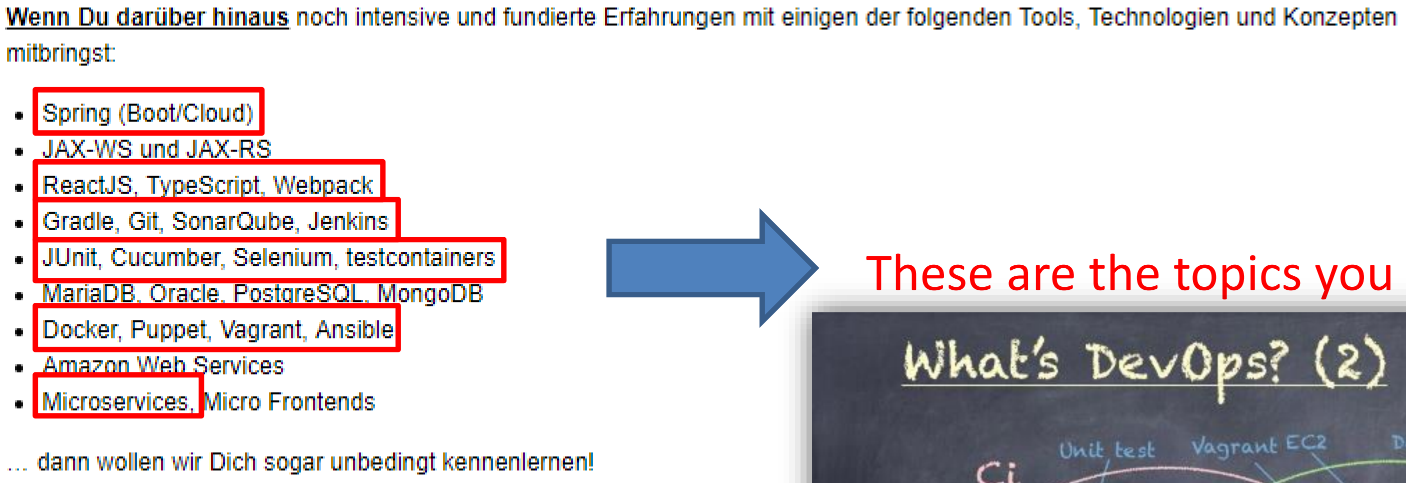
Kompetenzen: Webanwendungen | Clean Code | Fachplanung

Full-Stack Entwicklung - in Lübeck/Potsdam - BALVI ist seit über 20 Jahren auf die Softwareproduktion für die behördliche Überwachung von Tiergesundheit sowie Lebensmittel- und Futtermittelsicherheit spezialisiert.

Full-Stack Java-Entwickler (m/w)

Essential skills that are needed in industry!

Wanted Skills

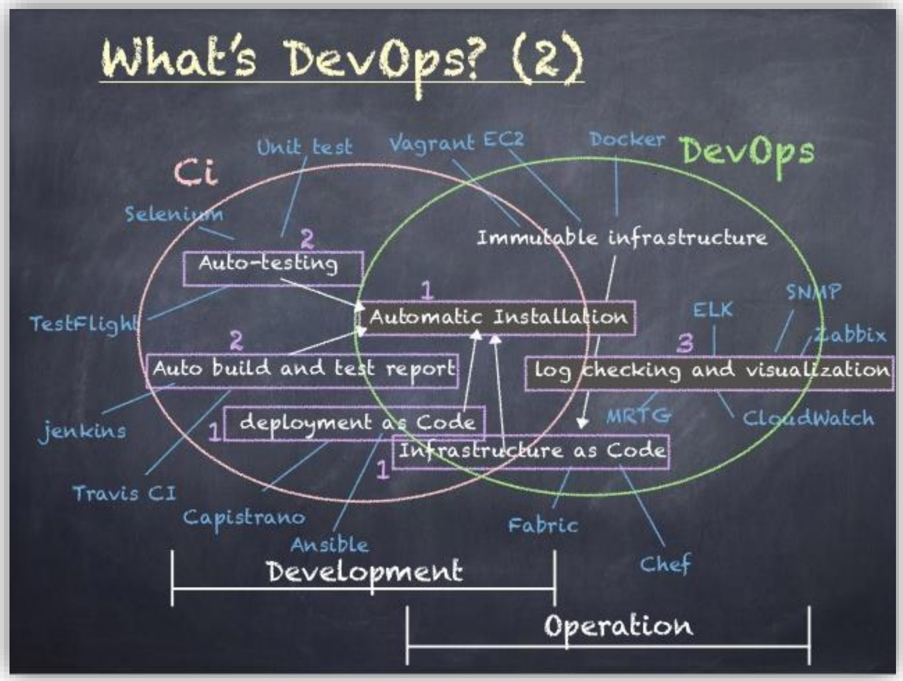


Wenn Du darüber hinaus noch intensive und fundierte Erfahrungen mit einigen der folgenden Tools, Technologien und Konzepten mitbringst:

- Spring (Boot/Cloud)
- JAX-WS und JAX-RS
- ReactJS, TypeScript, Webpack
- Gradle, Git, SonarQube, Jenkins
- JUnit, Cucumber, Selenium, testcontainers
- MariaDB, Oracle, PostgreSQL, MongoDB
- Docker, Puppet, Vagrant, Ansible
- Amazon Web Services
- Microservices, Micro Frontends

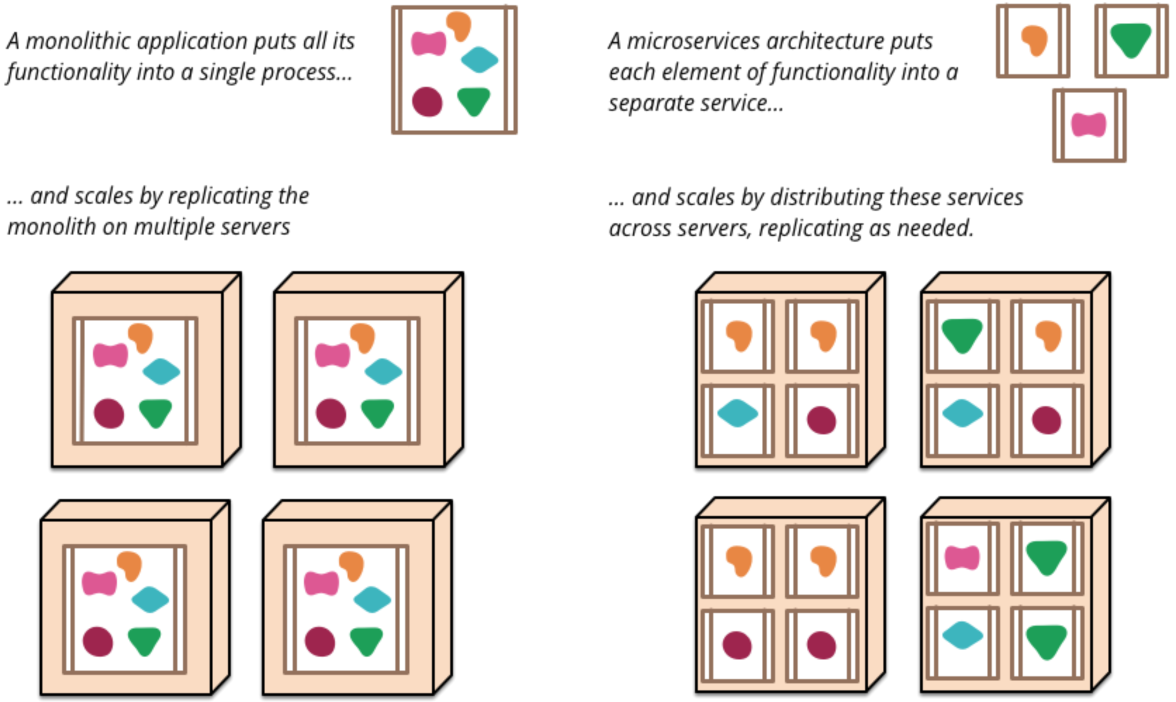
… dann wollen wir Dich sogar unbedingt kennenlernen!

These are the topics you will learn!



MicroServices

- Functional scalable applications

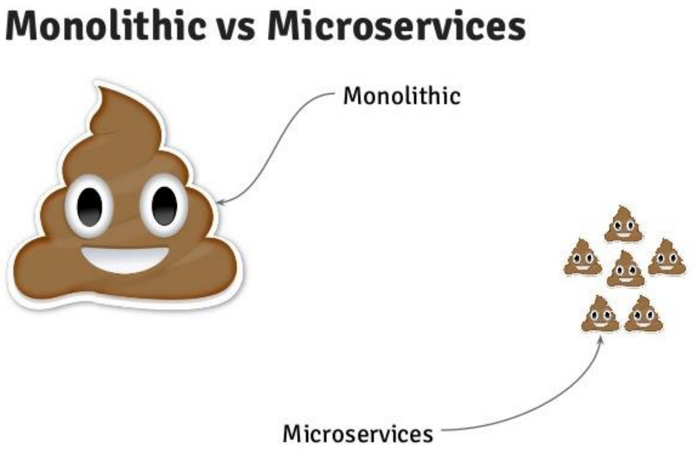


A monolithic application puts all its functionality into a single process...

... and scales by replicating the monolith on multiple servers

A microservices architecture puts each element of functionality into a separate service...

... and scales by distributing these services across servers, replicating as needed.

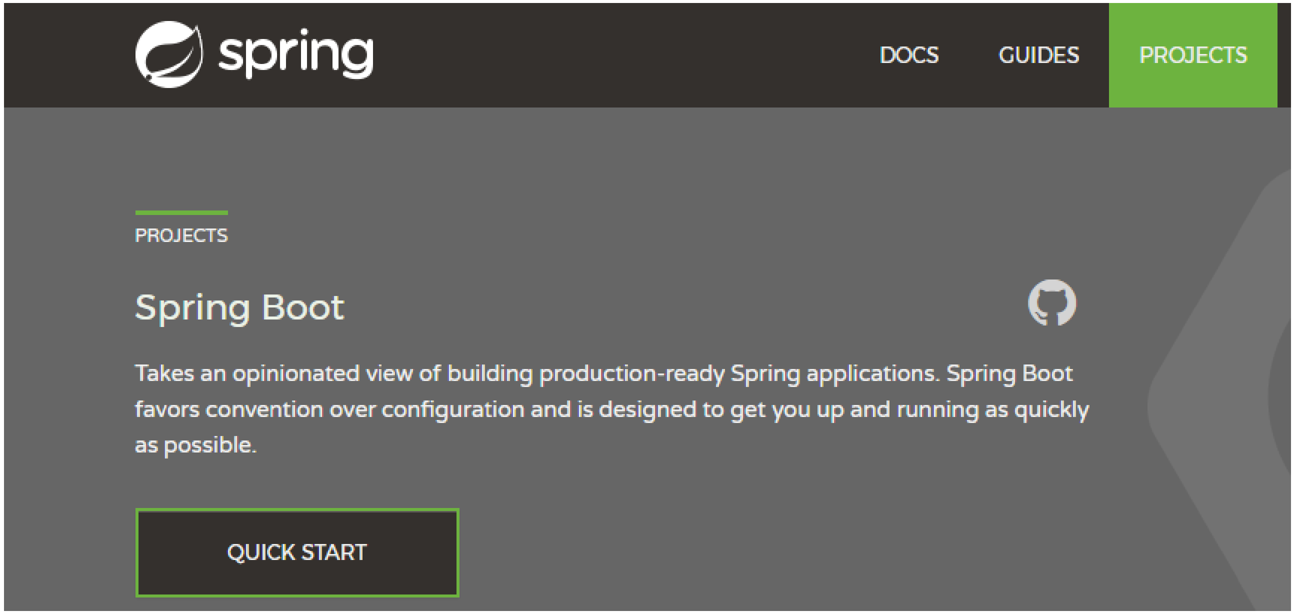


Monolithic vs Microservices

Frontend: Vue.js
Service-Layer: REST
Backend: Spring Boot

Spring Boot

- Rapidly build Web-based Java applications with minimal overhead
- Basis for Web services and digitization



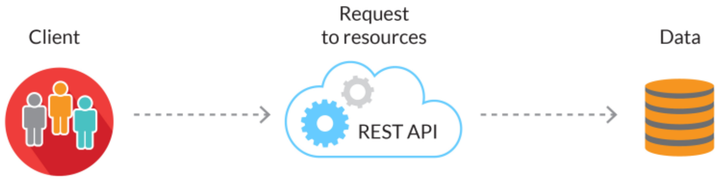
PROJECTS

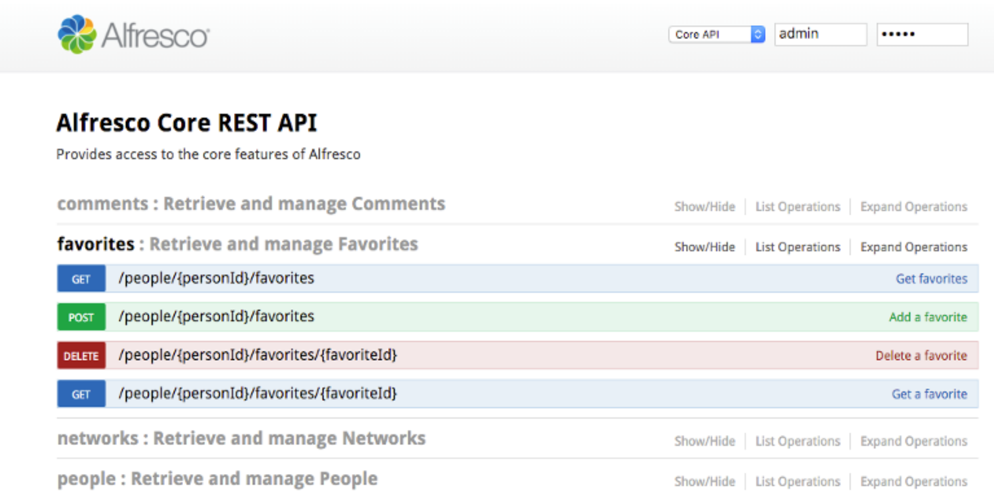
Spring Boot

Takes an opinionated view of building production-ready Spring applications. Spring Boot favors convention over configuration and is designed to get you up and running as quickly as possible.

REST: Representational State Transfer

- Programming paradigm for distributed systems (e.g., Web services)
- Every resource or entity addressed by an URI will elicit a response (e.g., as XML, HTML, JSON, etc.)





Alfresco Core REST API

Provides access to the core features of Alfresco

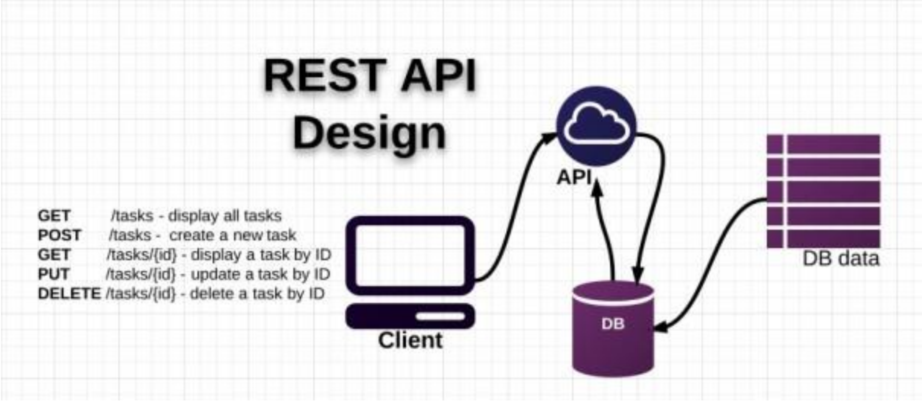
comments : Retrieve and manage Comments — Show/Hide | List Operations | Expand Operations

favorites : Retrieve and manage Favorites — Show/Hide | List Operations | Expand Operations

GET	/people/{personId}/favorites	Get favorites
POST	/people/{personId}/favorites	Add a favorite
DELETE	/people/{personId}/favorites/{favoriteId}	Delete a favorite
GET	/people/{personId}/favorites/{favoriteId}	Get a favorite

networks : Retrieve and manage Networks — Show/Hide | List Operations | Expand Operations

people : Retrieve and manage People — Show/Hide | List Operations | Expand Operations

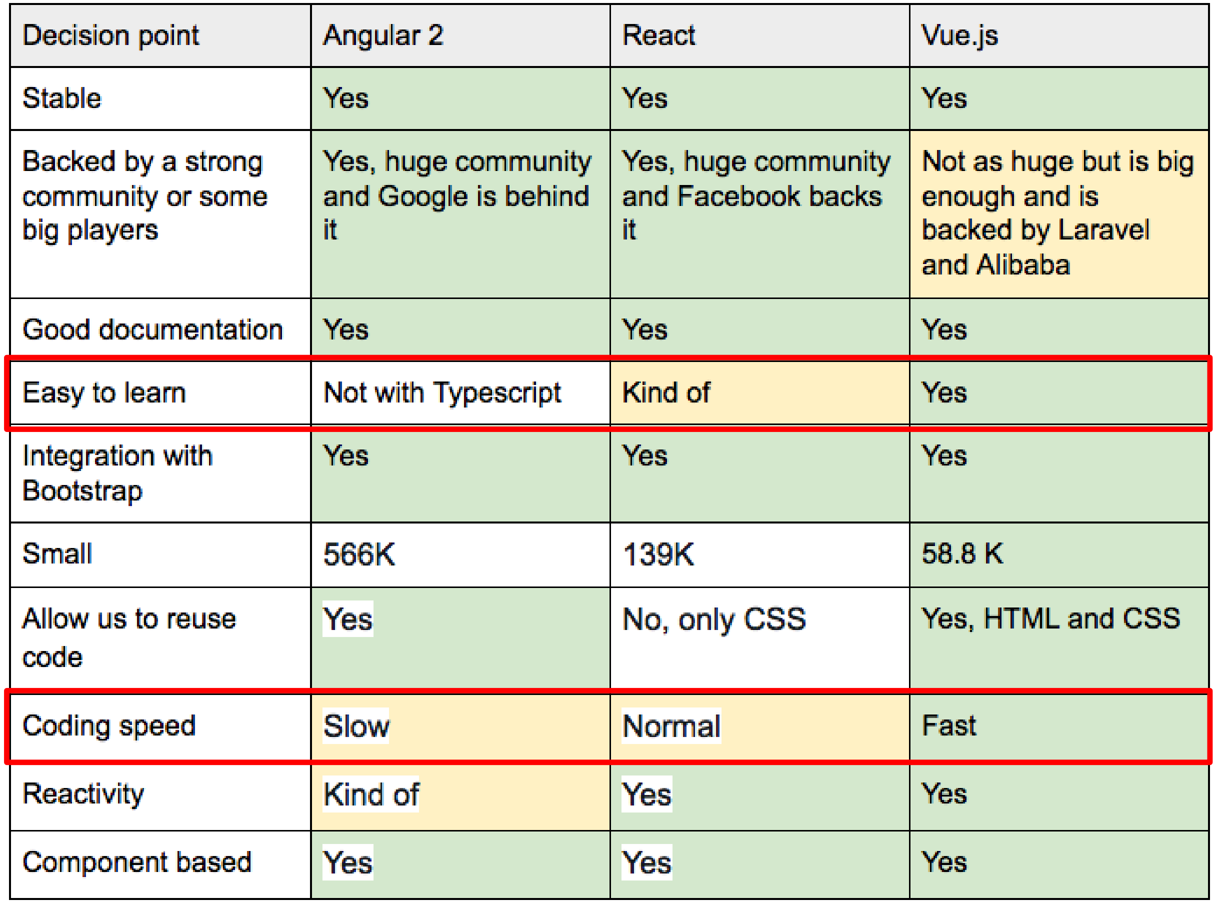


GET	/tasks - display all tasks
POST	/tasks - create a new task
GET	/tasks/{id} - display a task by ID
PUT	/tasks/{id} - update a task by ID
DELETE	/tasks/{id} - delete a task by ID

Vue.js (or …)

The Progressive JavaScript Framework

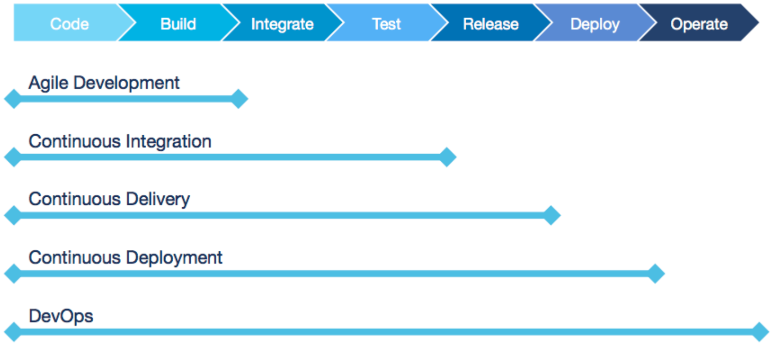
- Easy to learn JavaScript-Framework for rapidly building user interfaces



Decision point	Angular 2	React	Vue.js
Stable	Yes	Yes	Yes
Backed by a strong community or some big players	Yes, huge community and Google is behind it	Yes, huge community and Facebook backs it	Not as huge but is big enough and is backed by Laravel and Alibaba
Good documentation	Yes	Yes	Yes
Easy to learn	Not with Typescript	Kind of	Yes
Integration with Bootstrap	Yes	Yes	Yes
Small	566K	139K	58.8 K
Allow us to reuse code	Yes	No, only CSS	Yes, HTML and CSS
Coding speed	Slow	Normal	Fast
Reactivity	Kind of	Yes	Yes
Component based	Yes	Yes	Yes

Continuous Integration (CI)

- SE principle for trying to merge each change made to the code base into productive code
  - Continuous testing (and deployment)
  - Change rejected when test fails or code quality is low



Code → Build → Integrate → Test → Release → Deploy → Operate

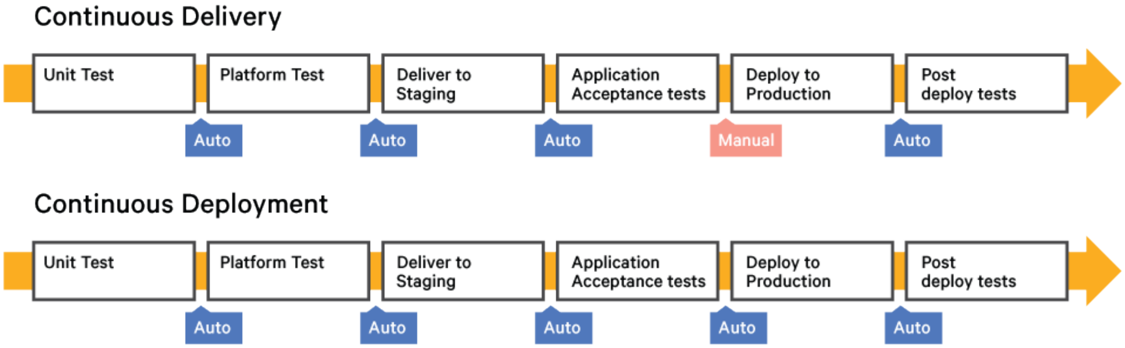
Agile Development

Continuous Integration

Continuous Delivery

Continuous Deployment

DevOps



Continuous Delivery

Unit Test → Platform Test → Deliver to Staging → Application Acceptance tests → Deploy to Production → Post deploy tests

Auto, Auto, Auto, Manual, Auto

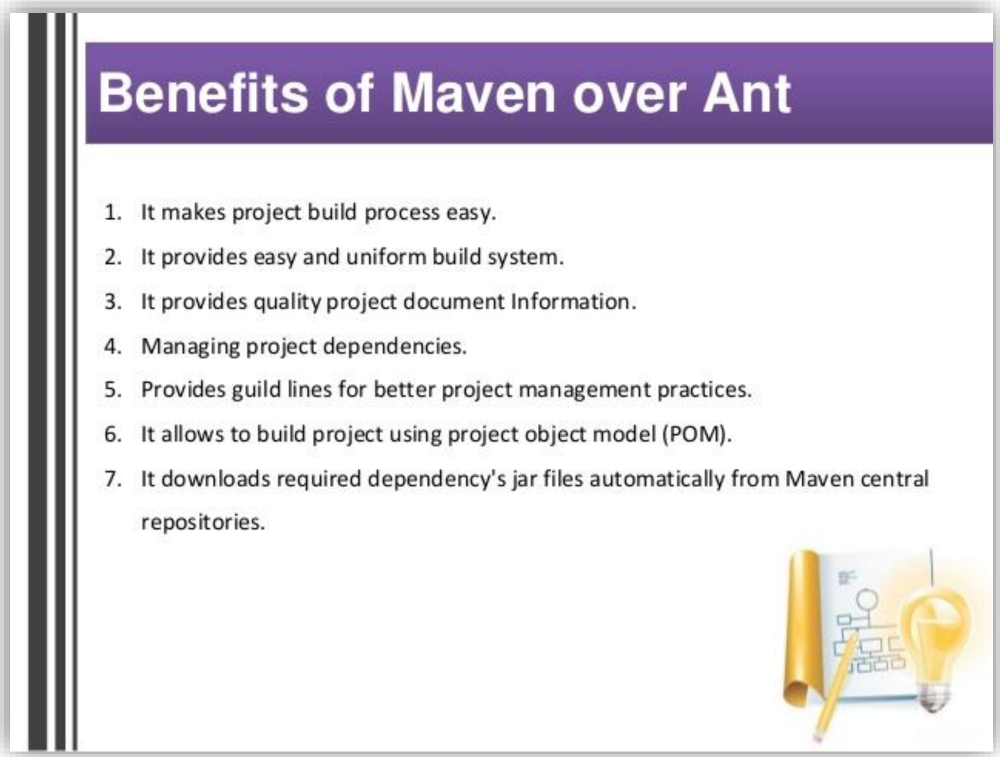
Continuous Deployment

Unit Test → Platform Test → Deliver to Staging → Application Acceptance tests → Deploy to Production → Post deploy tests

Auto, Auto, Auto, Auto, Auto

Maven™ (or Gradle)

- Manages project **builds**, **dependencies**, and **reporting**

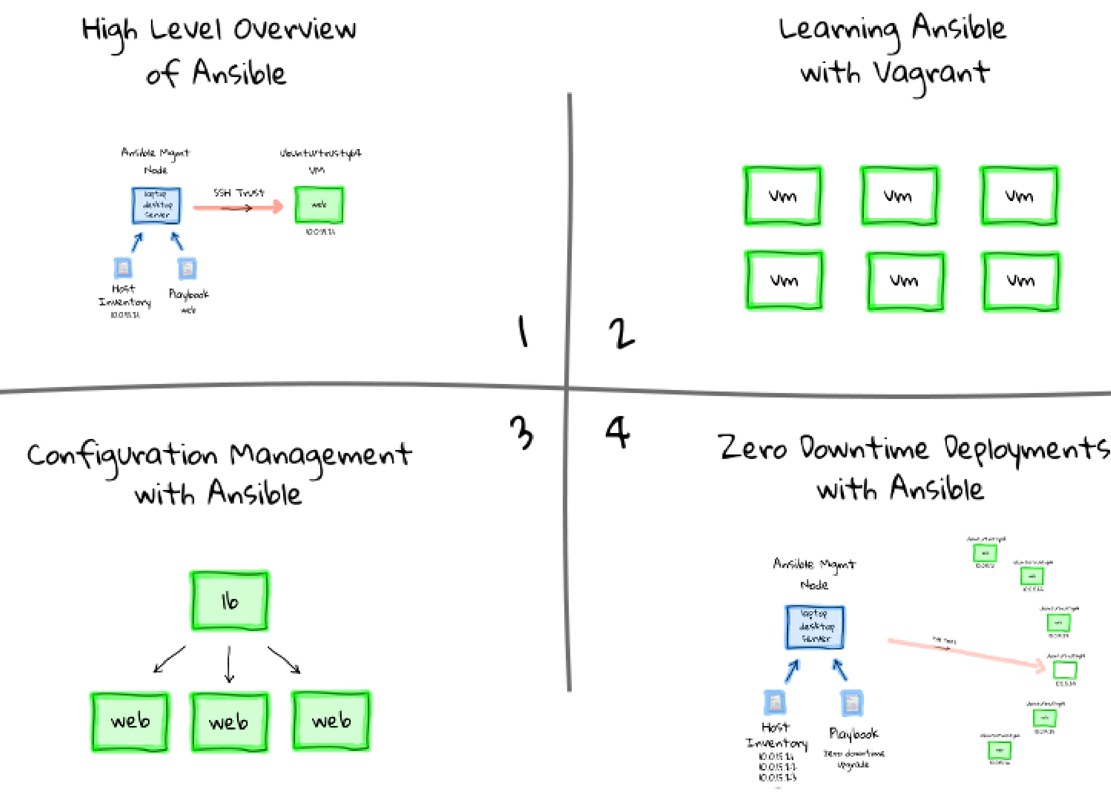


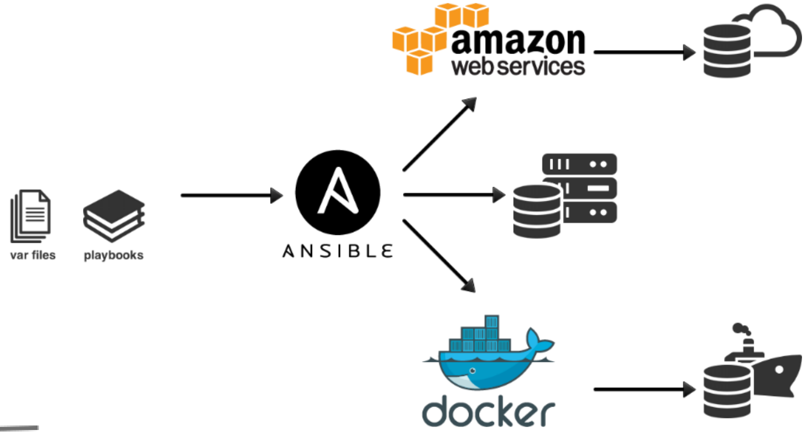
Benefits of Maven over Ant

1. It makes project build process easy.
2. It provides easy and uniform build system.
3. It provides quality project document Information.
4. Managing project dependencies.
5. Provides guild lines for better project management practices.
6. It allows to build project using project object model (POM).
7. It downloads required dependency's jar files automatically from Maven central repositories.

Ansible

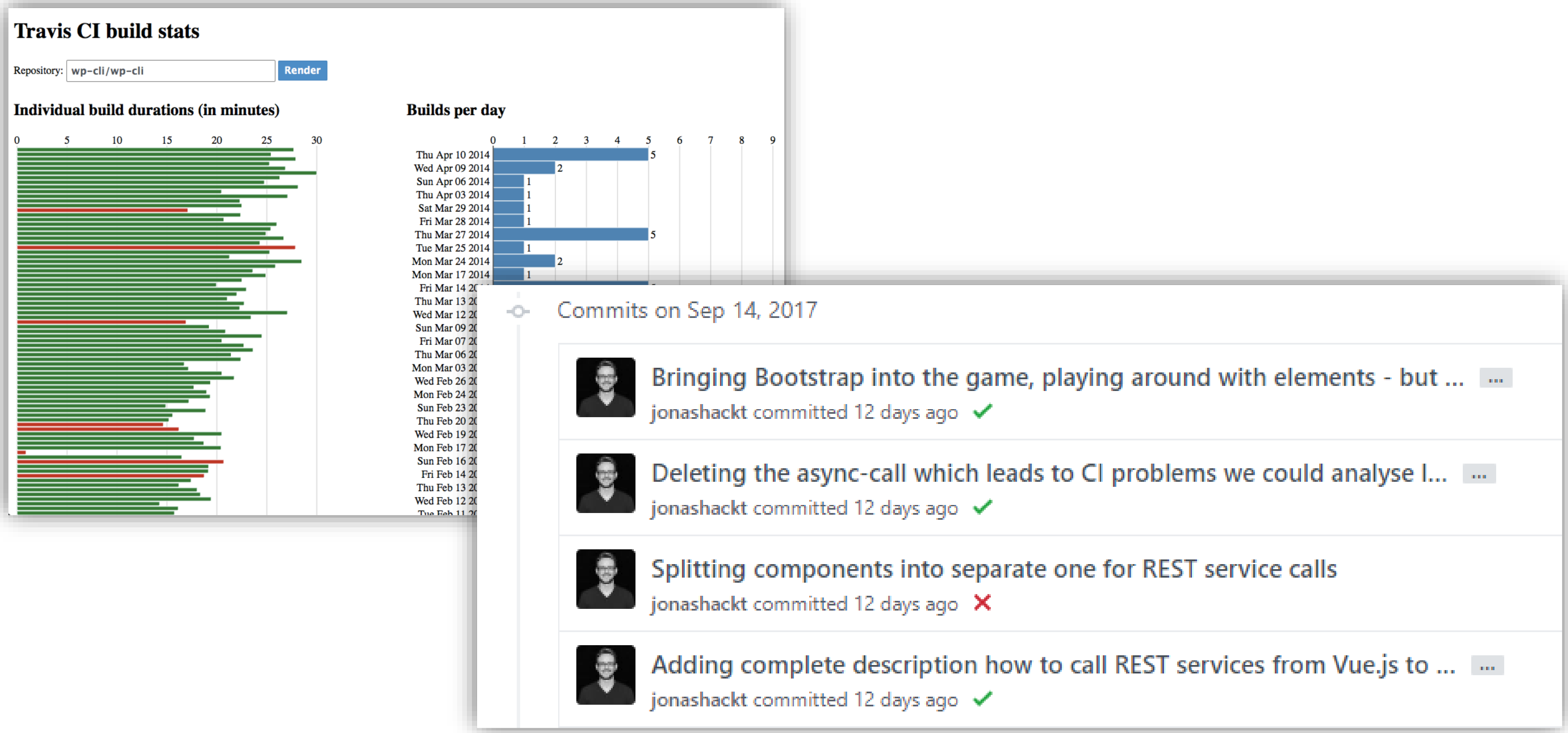
- Automation engine for software deployment and administration as well as configuration management





Travis CI (or Jenkins)

- Distributed continuous integration service for building and testing software projects (e.g., GitHub)



Travis CI build stats

Repository: wp-cli/wp-cli

Render

Commits on Sep 14, 2017

Bringing Bootstrap into the game, playing around with elements - but ... …
jonashackt committed 12 days ago ✓

Deleting the async-call which leads to CI problems we could analyse l... …
jonashackt committed 12 days ago ✓

Splitting components into separate one for REST service calls
jonashackt committed 12 days ago ✗

Adding complete description how to call REST services from Vue.js to ... …
jonashackt committed 12 days ago ✓

Continuous Code Analysis

COVERALLS

★ DELIVER BETTER CODE ★

Web service for tracking code (line) coverage of your tests

Inspect health or quality of your project

sonarqube

CODACY

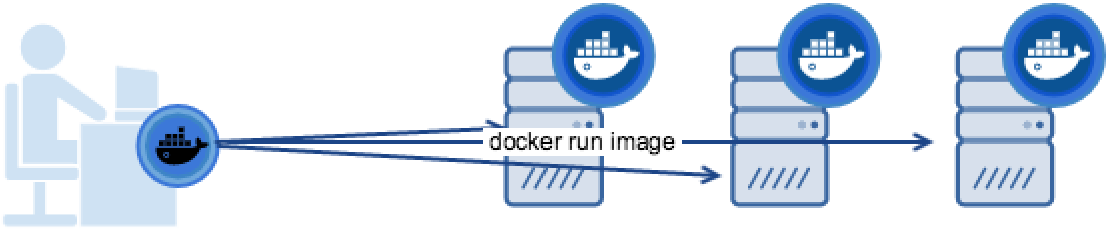
Alternative to sonarqube

JUnit (and Selenium for GUI Testing)

Unit testing for Java applications

Tool suite to automate Web browsers for testing purposes docker

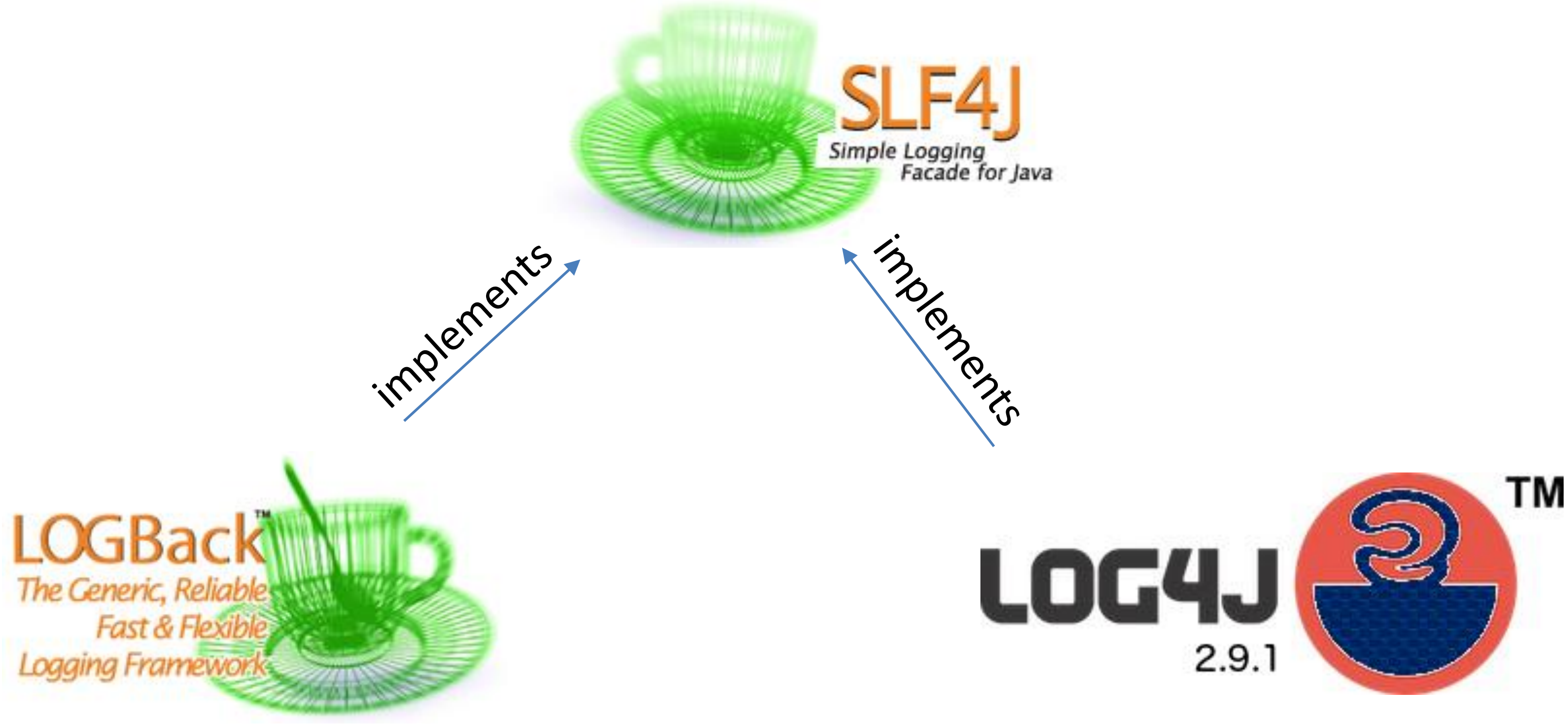
Eliminating the problem of “works on my machine”



Software runs on isolated containers that are easy to deploy and run without overhead

Bonus: Logging in Java (LogBack)

Abstraction for various logging frameworks

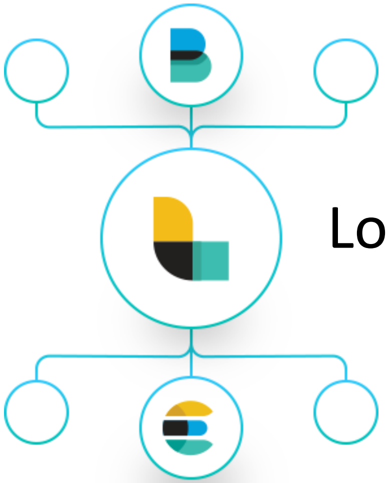


implements

implements

Bonus: Log Analysis with Elastic Search

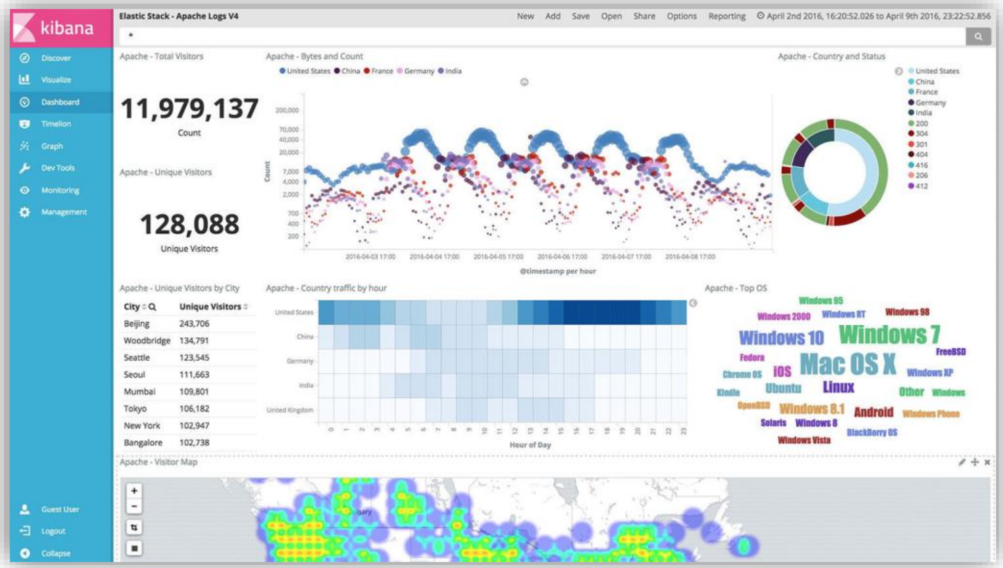
Beats: Data transfer to Logstash



Logstash: Dynamic pipeline for data collection

Elastic Search:
Distributed search and
analysis engine

Kibana for visualization and analysis

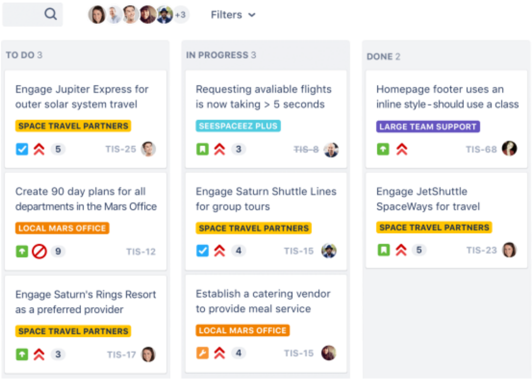


Apache - Unique Visitors by City

City	Unique Visitors
Beijing	243,706
Woodbridge	134,791
Seattle	123,545
Seoul	111,663
Mumbai	109,801
Tokyo	106,182
New York	102,947
Bangalore	102,738

Bonus: Ticketing and Issue Systems (Jira/GitHub Issues)

JIRA Project management tool for agile software development



TO DO 3

- Engage Jupiter Express for outer solar system travel — SPACE TRAVEL PARTNERS — 5 — TIS-25
- Create 90 day plans for all departments in the Mars Office — LOCAL MARS OFFICE — 9 — TIS-12
- Engage Saturn's Rings Resort as a preferred provider — SPACE TRAVEL PARTNERS — 3 — TIS-17

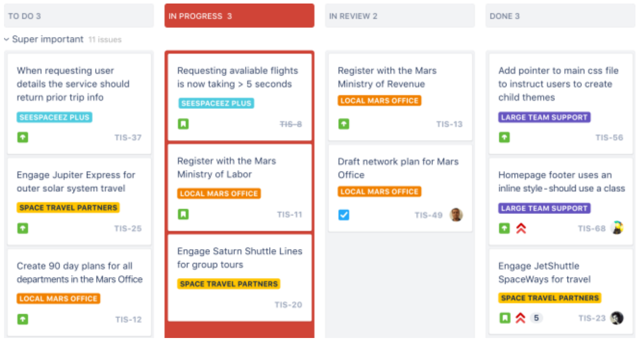
IN PROGRESS 3

- Requesting avaliable flights is now taking > 5 seconds — SEESPACEEZ PLUS — 3 — ~~TIS-8~~
- Engage Saturn Shuttle Lines for group tours — SPACE TRAVEL PARTNERS — 4 — TIS-15
- Establish a catering vendor to provide meal service — LOCAL MARS OFFICE — 4 — TIS-15

DONE 2

- Homepage footer uses an inline style - should use a class — LARGE TEAM SUPPORT — TIS-68
- Engage JetShuttle SpaceWays for travel — SPACE TRAVEL PARTNERS — 5 — TIS-23

Scrum boards



TO DO 3

Super important 11 issues

- When requesting user details the service should return prior trip info — SEESPACEEZ PLUS — TIS-37
- Engage Jupiter Express for outer solar system travel — SPACE TRAVEL PARTNERS — TIS-25
- Create 90 day plans for all departments in the Mars Office — LOCAL MARS OFFICE — TIS-12

IN PROGRESS 3

- Requesting avaliable flights is now taking > 5 seconds — SEESPACEEZ PLUS — ~~TIS-8~~
- Register with the Mars Ministry of Labor — LOCAL MARS OFFICE — TIS-11
- Engage Saturn Shuttle Lines for group tours — SPACE TRAVEL PARTNERS — TIS-20

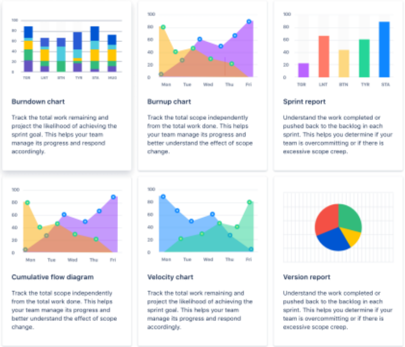
IN REVIEW 2

- Register with the Mars Ministry of Revenue — LOCAL MARS OFFICE — TIS-13
- Draft network plan for Mars Office — LOCAL MARS OFFICE — TIS-49

DONE 3

- Add pointer to main css file to instruct users to create child themes — LARGE TEAM SUPPORT — TIS-56
- Homepage footer uses an inline style - should use a class — LARGE TEAM SUPPORT — TIS-68
- Engage JetShuttle SpaceWays for travel — SPACE TRAVEL PARTNERS — 5 — TIS-23

Kanban boards



Burndown chart

Track the total work remaining and project the likelihood of achieving the sprint goal. This helps your team manage its progress and respond accordingly.

Burnup chart

Track the total scope independently from the total work done. This helps your team manage its progress and better understand the effect of scope change.

Sprint report

Understand the work completed or pushed back to the backlog in each sprint. This helps you determine if your team is overcommitting or if there is excessive scope creep.

Cumulative flow diagram

Track the total scope independently from the total work done. This helps your team manage its progress and better understand the effect of scope change.

Velocity chart

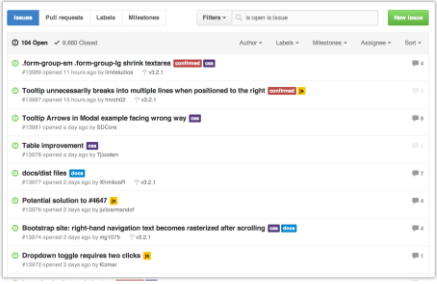
Track the total work remaining and project the likelihood of achieving the sprint goal. This helps your team manage its progress and respond accordingly.

Version report

Understand the work completed or pushed back to the backlog in each sprint. This helps you determine if your team is overcommitting or if there is excessive scope creep.

Reporting

GitHub Issues: Keep track of tasks, bugs, etc.



104 Open ✓ 9,660 Closed

- .form-group-sm .form-group-lg shrink textarea — confirmed — css — 4
  #13989 opened 11 hours ago by limitstudios — v3.2.1
- Tooltip unnecessarily breaks into multiple lines when positioned to the right — confirmed — js — 0
  #13987 opened 15 hours ago by hnrch02 — v3.2.1
- Tooltip Arrows in Modal example facing wrong way — css — 6
  #13981 opened a day ago by BDCore
- Table improvement — css — 0
  #13978 opened a day ago by Tjoosten
- docs/dist files — docs — 7
  #13977 opened 2 days ago by XhmikosR — v3.2.1
- Potential solution to #4647 — js — 4
  #13976 opened 2 days ago by julioarmandof
- Bootstrap site: right-hand navigation text becomes rasterized after scrolling — css — docs — 4
  #13974 opened 2 days ago by mg1075 — v3.2.1
- Dropdown toggle requires two clicks — js — 1
  #13972 opened 2 days ago by Kizmar

Practical Task: Digitalizing Charity Organization

- Ferienpass Weimar is a charity organization, which connects children with supporter providing activities during holiday

- Task: Digitalize the current analog and time consuming task of registering a child for an activity in form a Web application

What you will encounter

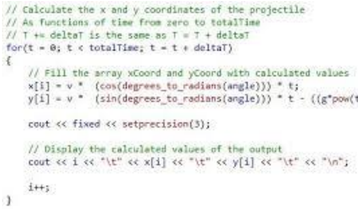
- **Real-world** problem
- Real **customers** who will **speak with you** about their requirements
- Open-source implementation **deployed in the cloud**

- Actually **used** application by hundreds of children and their parents!

Grading

- Presentation: 40%+10% present at the dates
  - Is the topic properly motivated?
  - Is the content correct and sufficient?
  - Is the style of the slides appropriate?
  - Is the talk engaging and easy to follow?

- Project / Tutorial: 50%
  - Is the person engaged to the project?
  - Does the implementation address the requirements?
  - Is the code properly commented / documented?
  - Alternatively, is the tutorial appropriate?



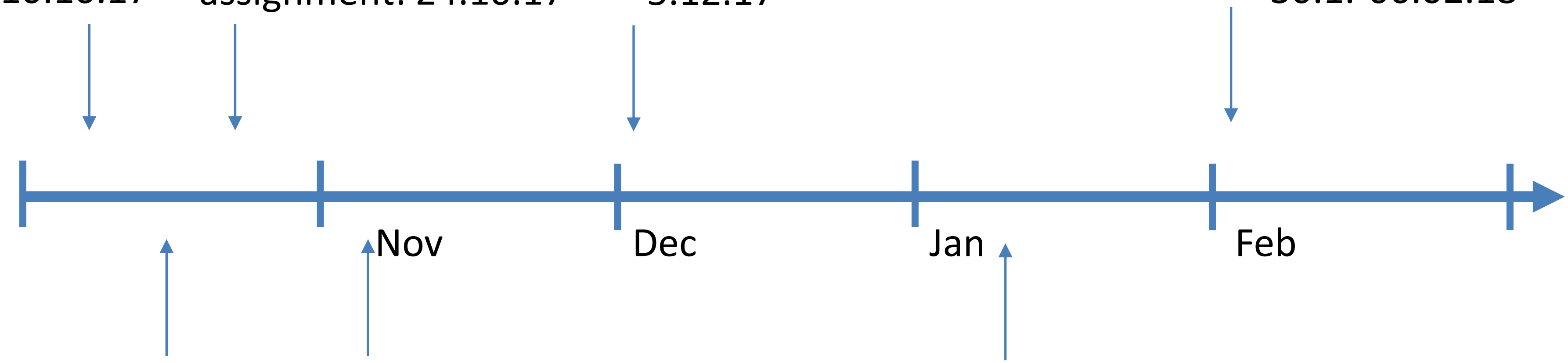
```
// Calculate the x and y coordinates of the projectile
// As functions of time from zero to totalTime
// T += deltaT is the same as T = T + deltaT
for(t = 0; t < totalTime; t = t + deltaT)
{
    // Fill the array xCoord and yCoord with calculated values
    x[i] = v *  (cos(degrees_to_radians(angle))) * t;
    y[i] = v *  (sin(degrees_to_radians(angle))) * t - ((g*pow(

    cout << fixed << setprecision(3);

    // Display the calculated values of the output
    cout << i << "\t" << x[i] << "\t" << y[i] << "\t" << "\n";

    i++;
}
```

Important Dates



Today:
10.10.17

Architecture & topic
assignment: 24.10.17

1. Milestone with customer!

Block presentation:
~5.12.17

3. Milestone

Block presentation:
30.1.-06.02.18

Customer:
17.10.17

How to do
presentations: 07.11.17

2. Milestone final acceptance with customer!

Block presentation:
09.-23.01.18

Milestones & Block Presentations

- 1. Milestone
  - Show initial Web page to the customer and initial functionality
  - 3x20min per demonstration + 5-10min discussion
- 2. Milestone
  - Similar to above, but with acceptance or rejection by customer
- 3. Milestone
  - Without customer and more in-depth analysis
- After demonstration:
  - Presentations of topics (20min)
  - Tutorials for non-customer related implementation (30min)

Scheduling the Milestones

- 3-4 hours in a row (or with a small break in between)
- Day of the week
    - Monday, Tuesday, Wednesday, Thursday, Friday?

- 1. Milestone: 5.12.?
- 2. Milestone: 08.01.? 23.01.?
- 3. Milestone: 30.01.? 06.01.?

Details…

- Topics are selected by lot (Lose); trading is possible within a day
- Depending on the topic, you implement a solution for the customer or prepare a tutorial for your fellow student
- Presentations need to be sent 1 week before the day for presentation arrives to get feedback

- Consultation with Jonas Hecht and me are possible and welcome
- Dates for presenting implementation/tutorial + topic depends on the concrete topic (some early Dec; some Jan)