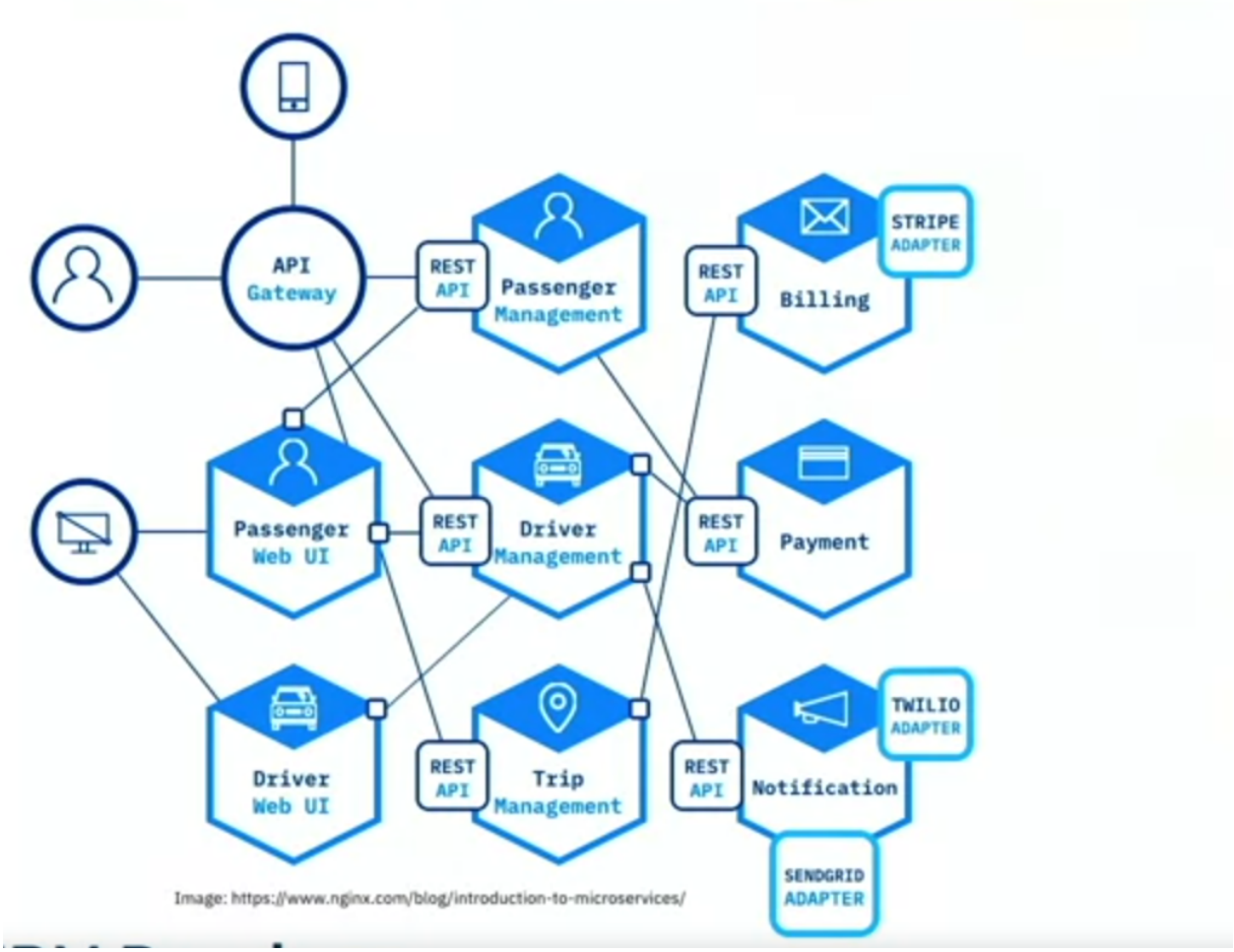
Cloud native microservices(devops)



Think differently about application design

The amazing thing is that all APi connected to each other by the lines ,are working on cloud microservices. No services is accessing the database, all are the microservices of cloud.

Its a cloud native design using microservices.

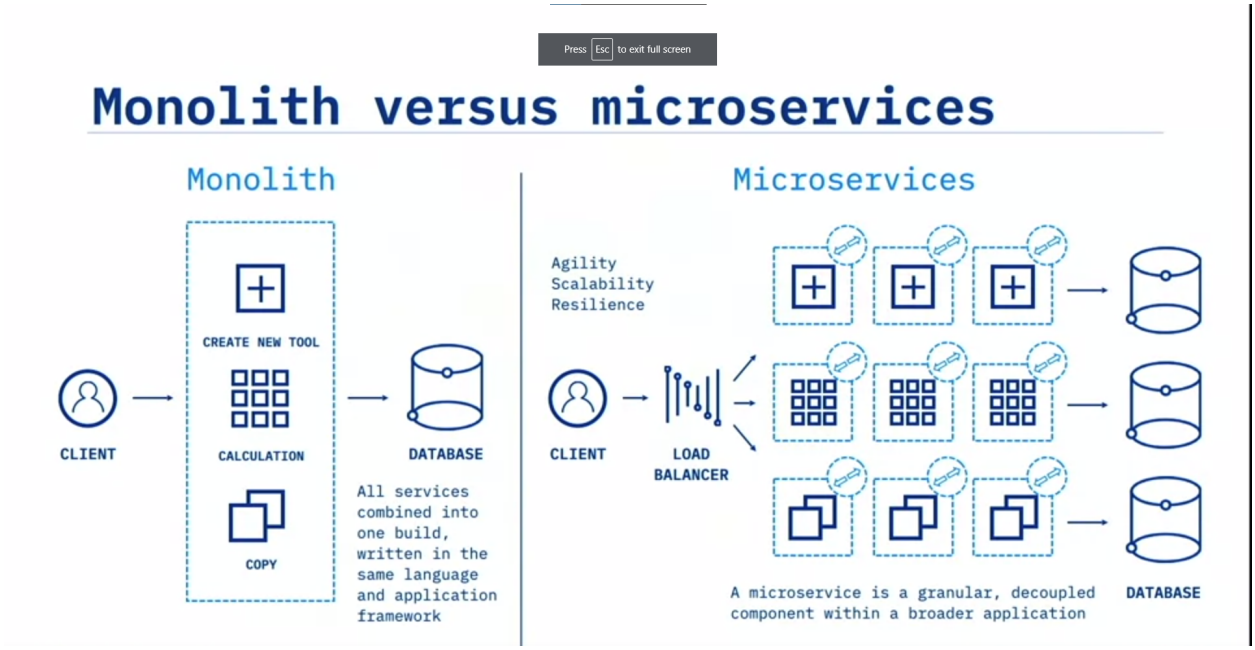
Think cloud native

- The Twelve-Factor App
- A collection of stateless microservices
- Each service maintains its own database
- Resilience through horizontal scaling
- Failing instances are killed and respawned
- Continuous delivery of services

Think microservices

"…the microservice architectural style is an approach to developing a single application as a **suite of small services**, each **running in its own process** and communicating with lightweight mechanisms, often an HTTP resource API. These services are **built around business capabilities** and **independently deployable** by fully automated deployment machinery."

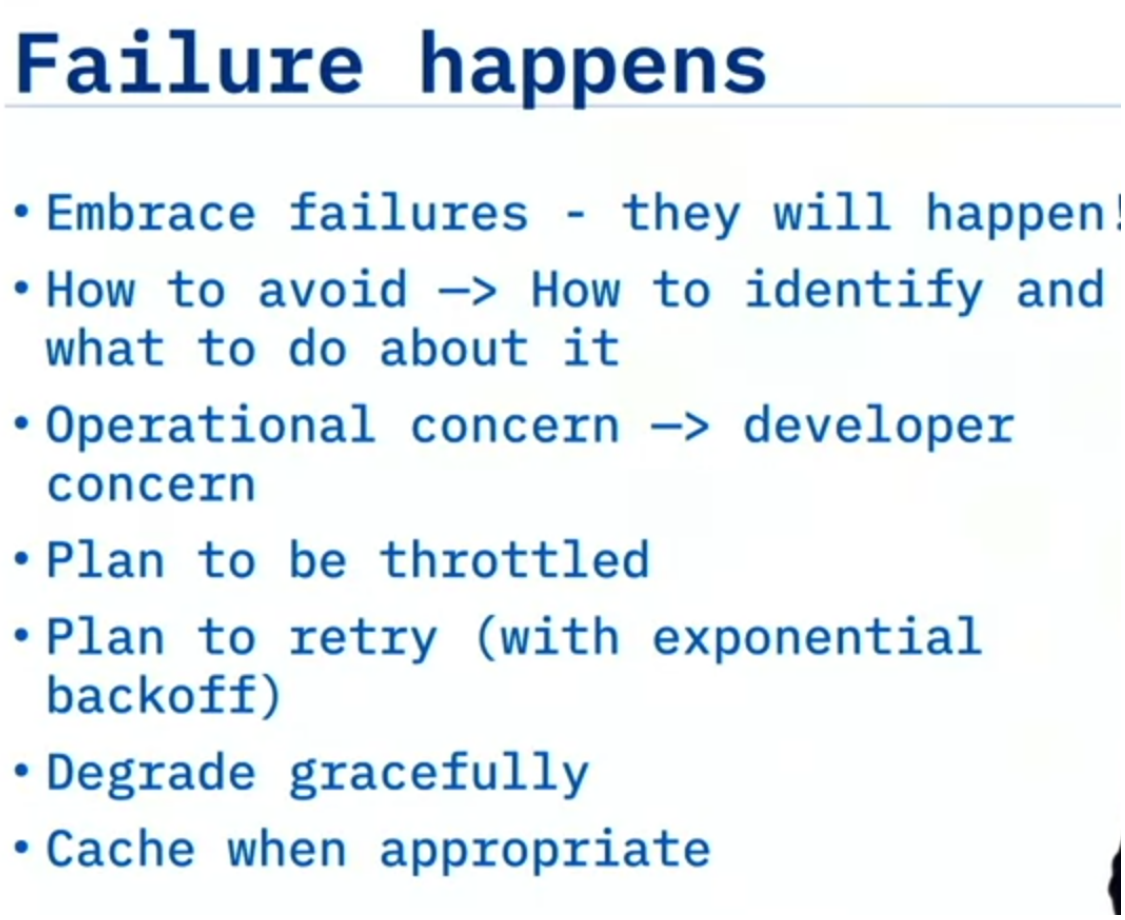
–Martin Fowler and James Lewis



Here each microservices has its own data base working with there own services

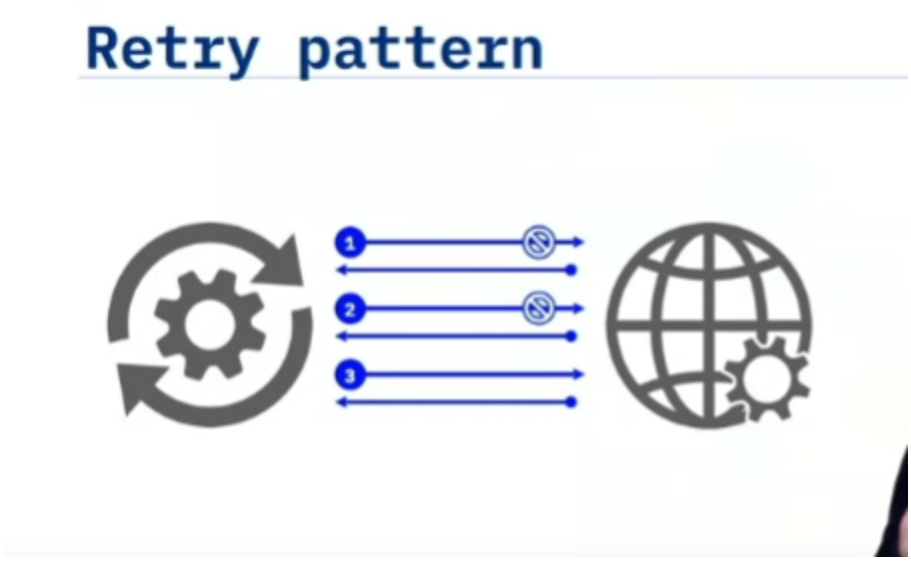
So in monolith if i have to make changes in website then i have to contact to the shipping team , and particular team required for deployment. But in microservices we dont have to contact any team .As we know we are using Rest API's here
Api is building on demand use case of table of customer as user required

Desgining Faliure"-

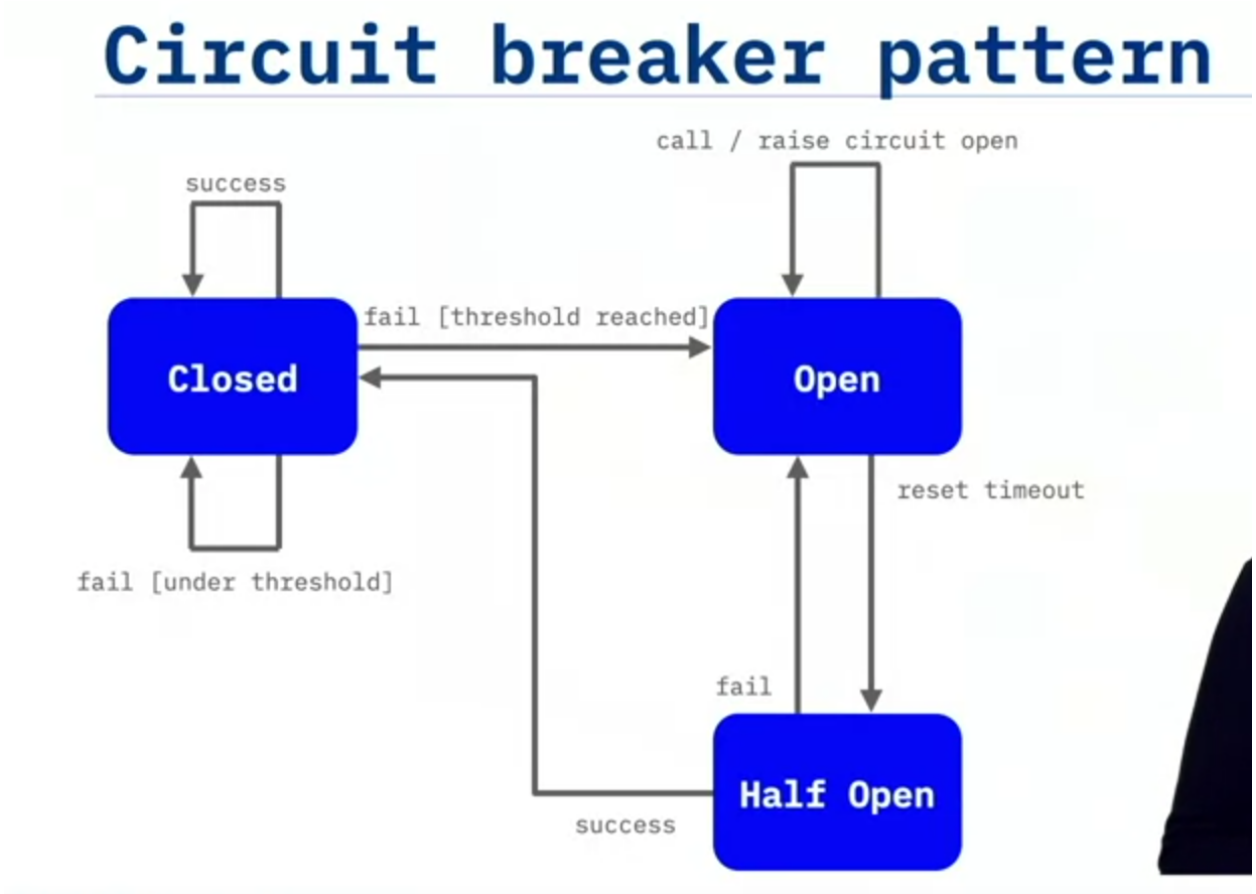


Failure patterns

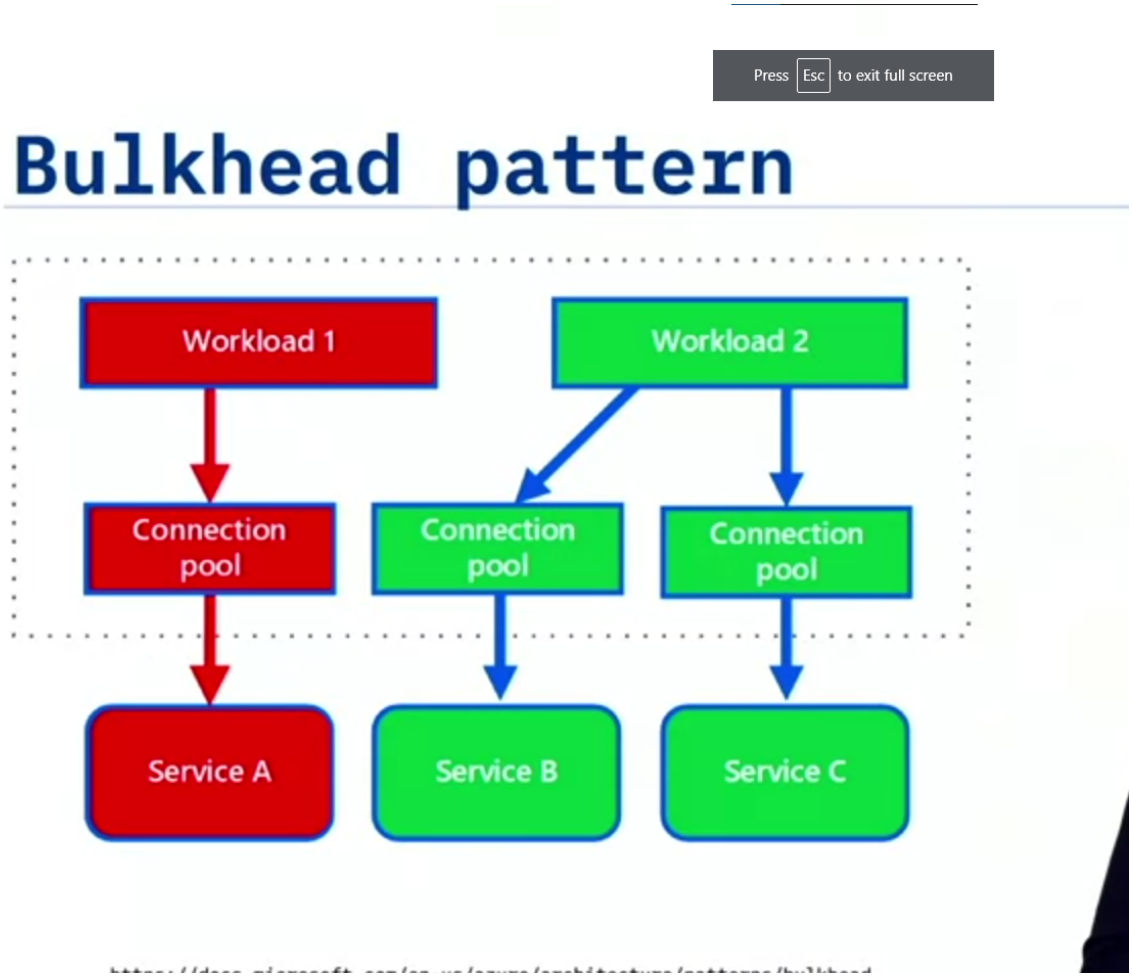
*retry pattern :- when we connect to server and fail to connect to the database . We retry to connect so try to develop in such way that retry pattern occurs . When connection is success this retry pattern in connection is over.



Circuit breaker pattern



Same it avoid failure in the circut by tripping the main switch.It avoid the cascading failure. Cascade failure is when one services is not available and other services is cascade
To another



Its name comes from the bulkhead design on a ship. Compartments that are below the waterline have walls called “bulkheads” between them. If the hull is breached, only one compartment will fill with water.

The bulkhead stops the water from affecting the other compartments and sinking the ship. Using the bulkhead pattern isolates consumers from the services as cascading failures by allowing them to preserve some functionality in the event of a service failure. Other services and features of the application continue to work.

Chaos Engineering;

Its also known as monkey testing
Also deliberately kill services.
Netflix too created a Siman army tools
We cannot know how somethong will respond when it fails.

Summary and Highlights

Congratulations! You have completed this lesson. At this point in the course, you know:

- Social coding is coding as a community and public repositories and pair programming result in higher code quality.
- Working in small batches reduces waste and means quickly delivering something useful to the customer.
- Minimum viable product is as much about delivery as it is about building what the customer really desires.
- Test driven development is writing the test for the code you wish you had, then writing the code to make the test pass. It allows you to develop faster and with more confidence.
- Behavior driven development focuses on the behavior of the system from the outside in. It looks at the system as a consumer of it.
- Behavior driven development improves communication by using an approachable syntax that developers and stakeholders can understand.
- Microservices are built around business capabilities and are independently deployable by fully automated deployment machinery.
- Cloud native architecture enables independently deployable microservices that take advantage of horizontal scaling and result in more resilient services.
- Failure is inevitable, so we design for failure rather than trying to avoid failure.
- It is important to embrace failure and quickly recover when failures happen.

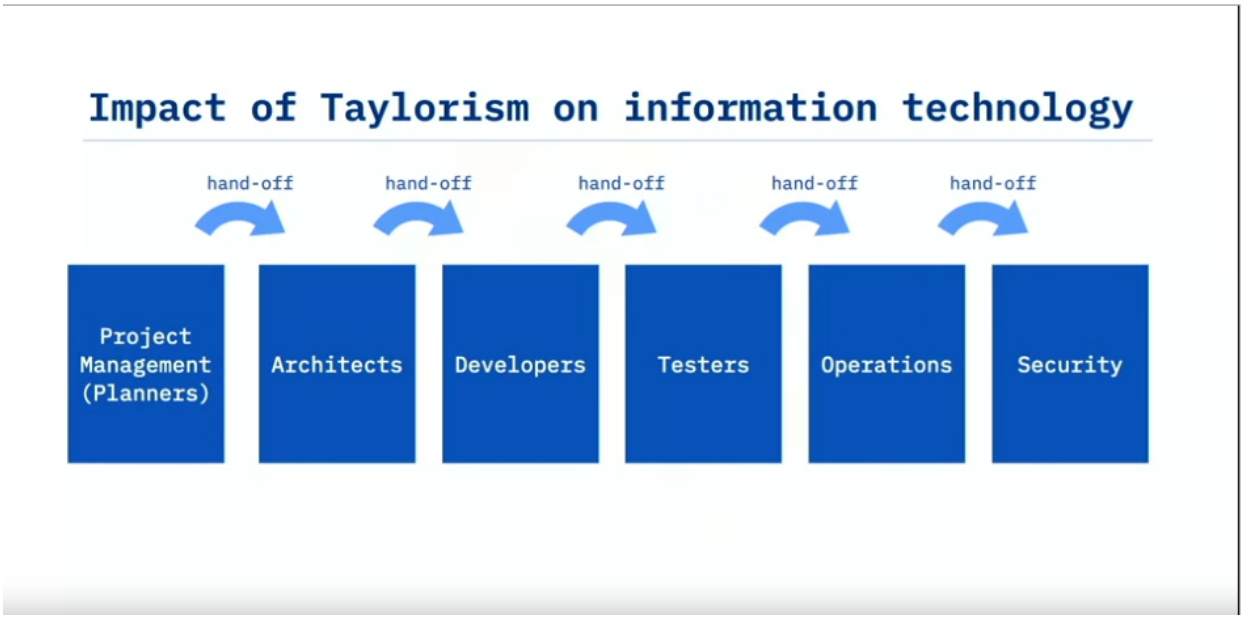
Taylorism and working in Slios.

Working DevOps

- Culture of teaming and collaboration
- Agile development as a shared discipline
- Automate relentlessly
- Push smaller releases faster

Taylorism

- Adoption of command and control management
- Organizations divided into functional silos
- Decision-making is separated from work



* These are the working process of the Taylorism as I have mentioned taylorism . Its a way how industrial revolution occurred and how its happening and manufacturing product.
* same way this taylorism works . How it goes hand to hand and it work in silos.

Abandon Command and Control

- Its not agile
- Stop working in Silos

  Software engineer vs Civil Engineering

  So in Software engineering we consistently Develop it , Edit it , maintain it.
  - Software Stack is continuously Updated
  - New feature is being added

    This affect the application
    - System bheavior is changed over time
    - Ye we treat software engineering like a civil engineering project

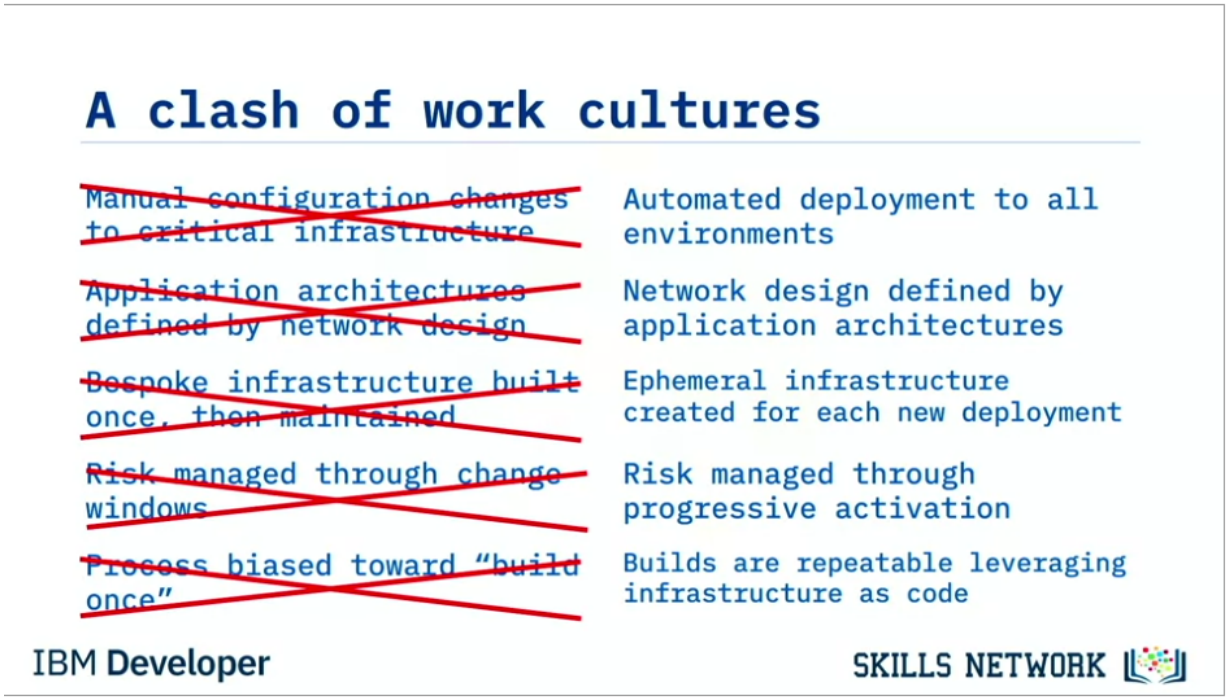
The project model is flawed

- The project model does not work for software development
- Treat software development like product development
- Encourage ownership and understanding
- Software engineering is not civil engineering
- Maintain stable, lasting teams

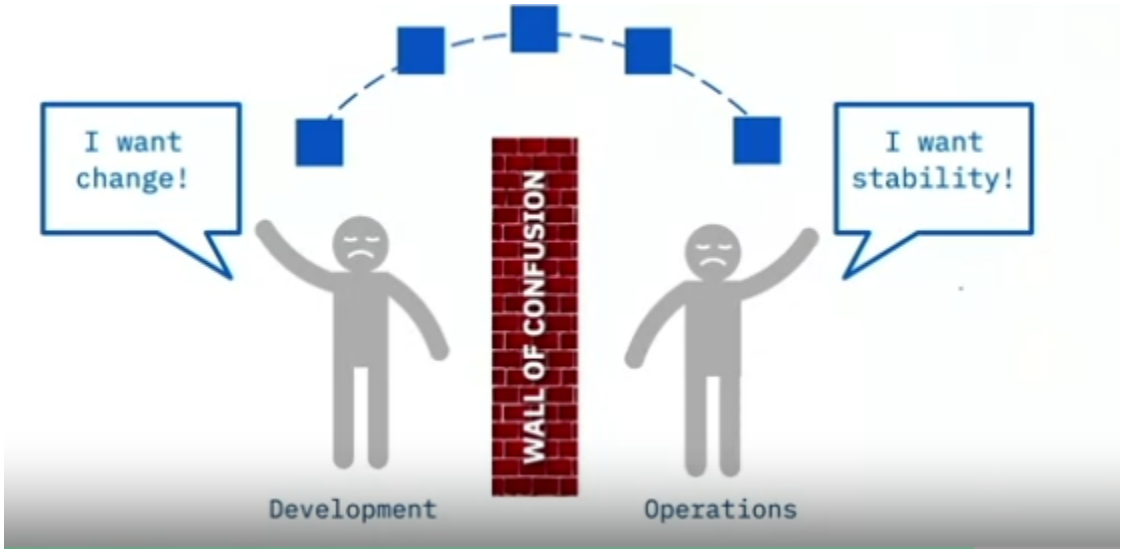
Required behaviour of Devops

Diametrically opposed views

- Enterprises see “new” as complex and time-consuming
- DevOps delivers a continual series of small changes
- These cannot survive traditional overheads



Last one is traditional ops which is gone to Devops
There is no win scenario
Its a innovation In development.. How much innovative developer is
Operations Also want stability



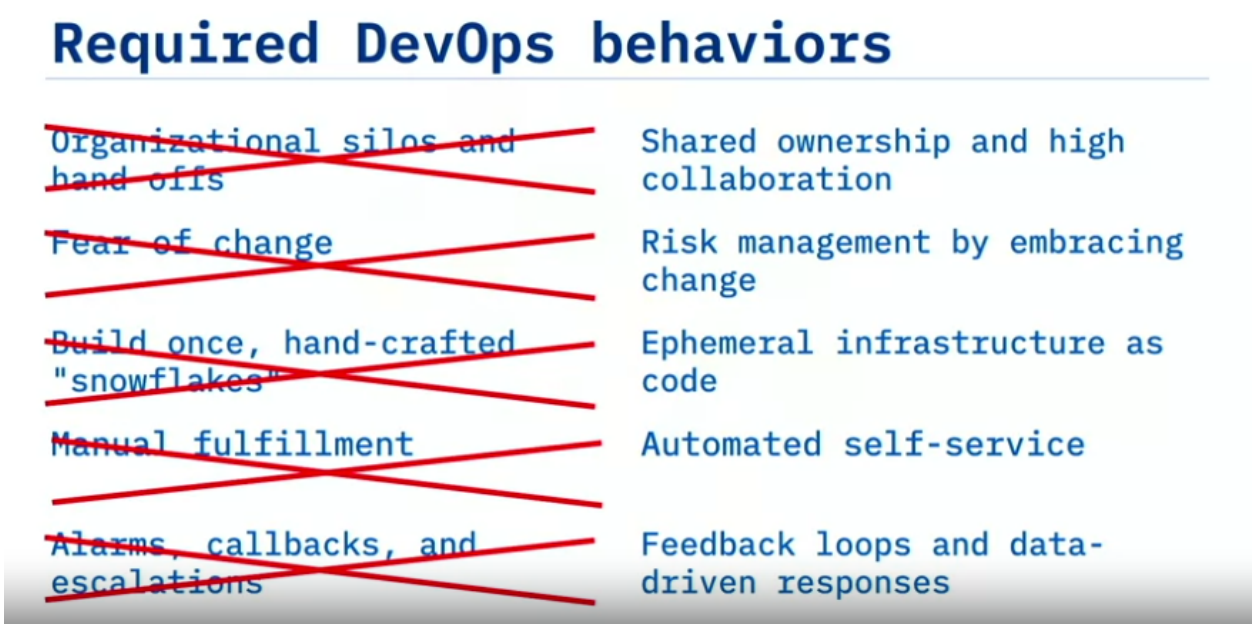
So we break the wall of Confusion as Devops engineer

Operations view of development

- Development teams throw dead cats over the wall
- Manually implemented changes
- Lack of back-out plans
- Lack of testing
- Environments that don't look like production

Development view of operations

- All-or-nothing changes
- Change windows in the dead of night
- Implemented by people furthest away from the application
- Ops just cuts and pastes from "runbooks"



Infrastructure As Code

Describabel code in textual format not in sense of documentatiions format.Its textual format which is executable here.

Configuration of textual description given to a tool to execute

These tools work and make it possible by configuration management.

Never perform this configuration manually.

Use of version control:-History of all changes so we let to know which version is latest version, and what we have to proceed on,

Immutable delivery via containers

- Applications are packaged in containers
- Same container that runs in production can be run locally
- Dependencies are contained
- No variance limits side-effects
- Rolling updates with immediate roll-back

Immutable way of working

- You never makes changes to a running container
- You make changes to the image
- Then redeploy a new container
- Keep images up to date

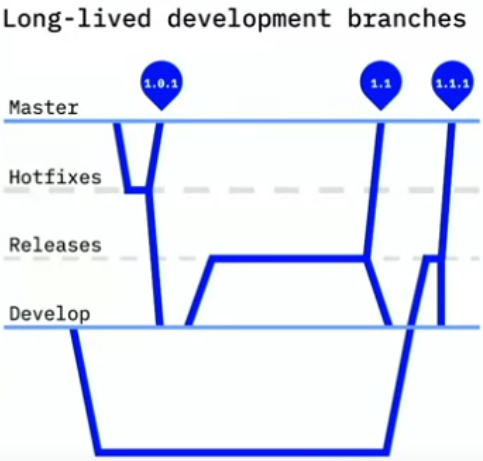
Continuous integration

Continuous Integration vs. Continuous Delivery

- CI/CD is not one thing
- Continuous Integration (CI)
  - Continuously building, testing, and merging to master
- Continuous Delivery (CD)
  - Continuously deploying to a production-like environment

Traditional development

- Developers work in long-lived development branches
- Branches are periodically merged into a release
- Builds are run periodically
- Developers continue to add to the development branch



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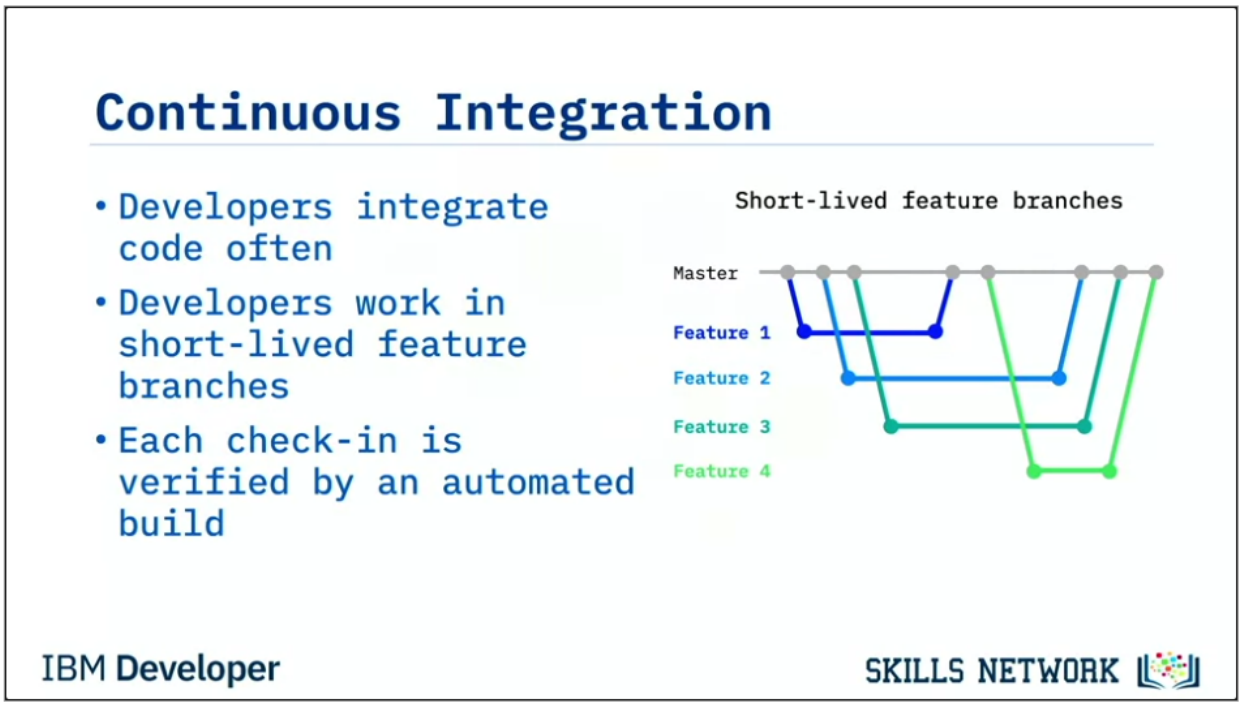


Changes are made small

Working in small batch.

Committing regularly

using pull request

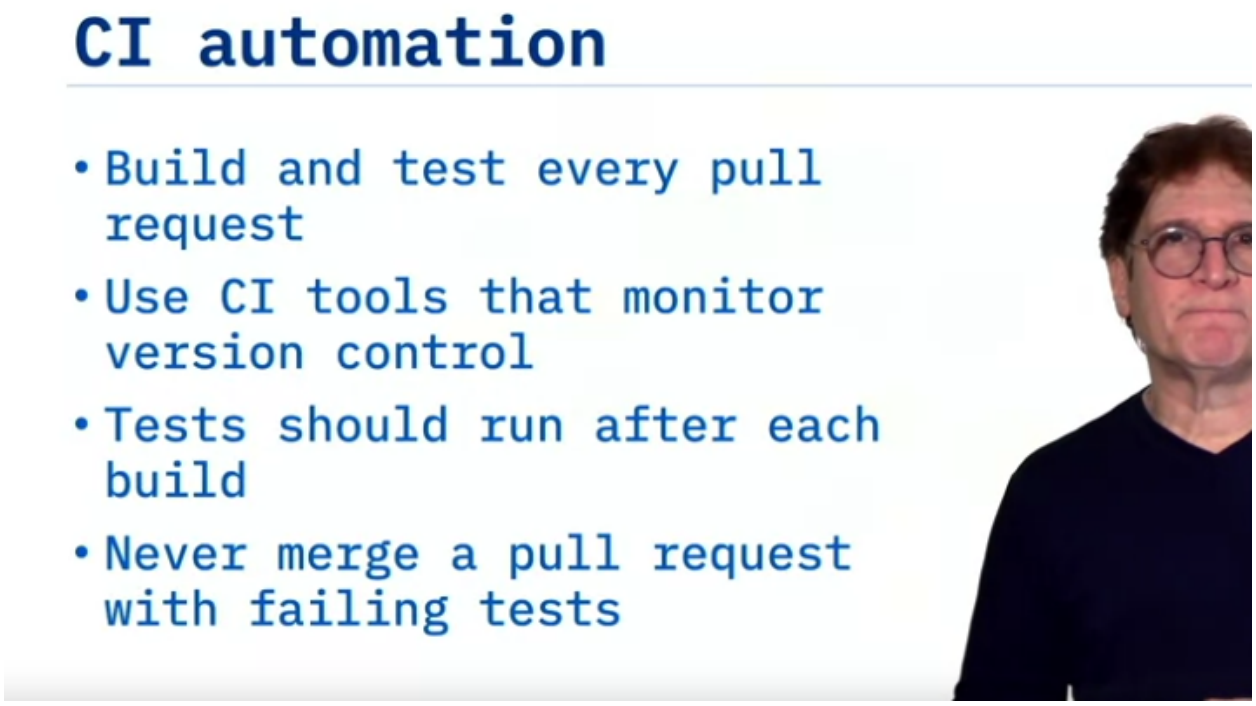
Commmminting all Changes daily

Continous delivery

Continous development is a software development discipline where the software is always ready for the deployment.

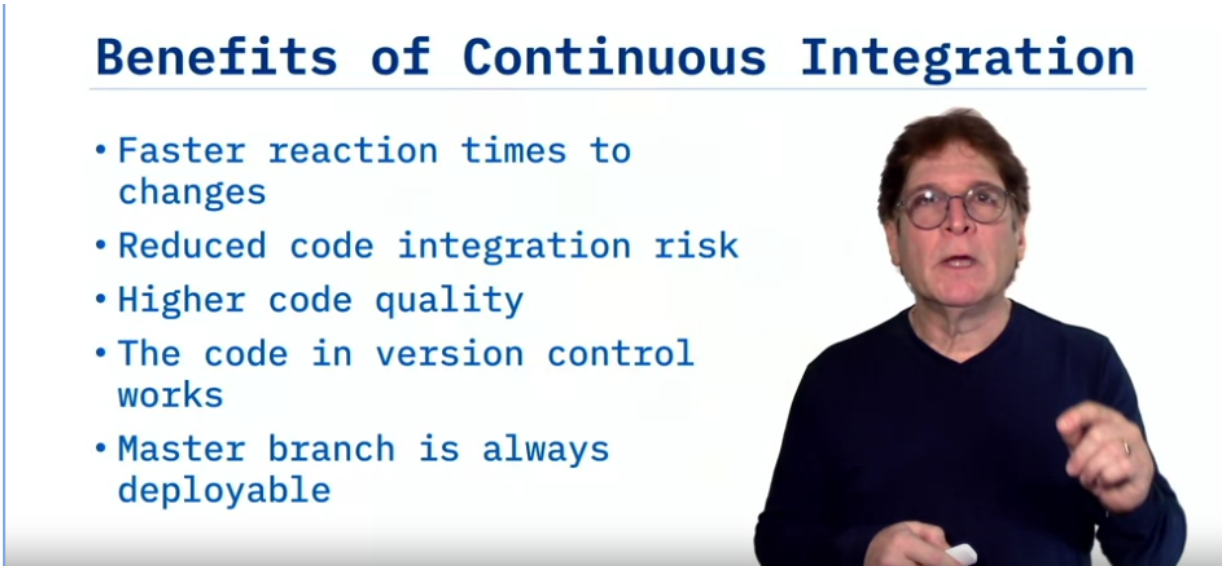
Release production at any times means

It means The master branch is always be deployable



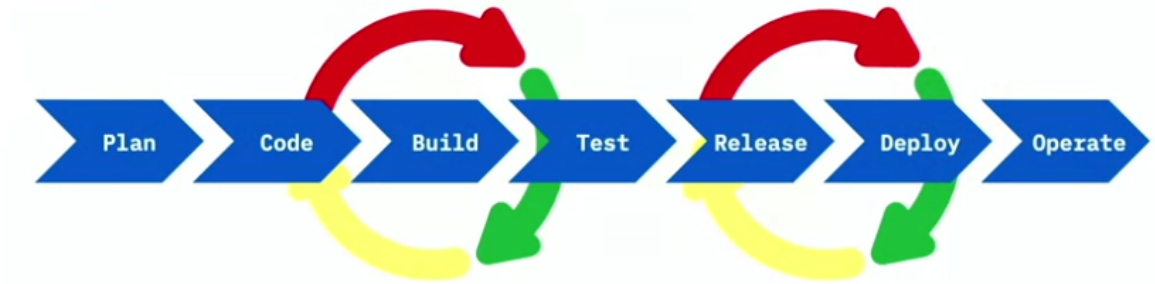
Focus in High quality of code and Master branch should be deployable

The CI/CD pipeline



Never merged untested code in master branch or it will create a mess.

Continuous integration and delivery



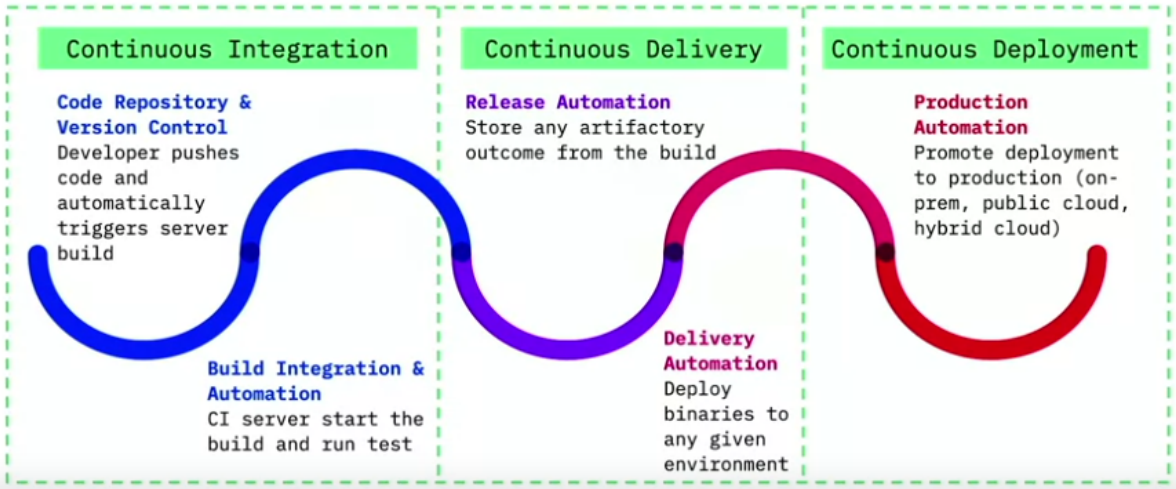
Continuous Delivery

Notes Discuss

Five key principles

1. Build quality in
2. Work in small batches
3. Computers perform repetitive tasks, people solve problems
4. Relentlessly pursue continuous improvement
5. Everyone is responsible

CI/CD + Continuous deployment



How DevOps manages risk

- Deployment is king
- Deployment is decoupled from activation
- Deployment is not “one size fits all”

Knight Capital was a financial service company on the stock exchange and was one of the largest traders in the U.S. market. Their market share was 17.3 of the New York Stock Exchange and 16.9 of NASDAQ.

The company had a retail liquidity program and wanted to replace old SMARS code with new RLP code. Their strategy was to repurpose a flag that turned it on and off. The old code was a power pipe peg that remained on the server. They were going to upgrade it, switch the flag, and then start running the new code. So, what could go wrong?

On August 1, 2012, they manually upgraded seven of the eight servers. A system administrator upgraded seven of them and forgot to upgrade the eighth server. They went into test mode and thought they were testing servers when they flipped the switch. Instead, the eighth server ran real transactions on the real Internet to the tune of a $640 million loss.

This caused a major disruption in the prices of 148 companies listed on the New York Stock Exchange. Incoming parent orders were processed. The defective power pipe peg sent millions of child orders resulting in 4 million executions of 154 stocks of more than 397 million shares in approximately 45 minutes. The next day Knight Capital was out of business—bankrupt— because someone did not upgrade that eighth server. The old code ran, and it made transactions it should not have made.

What could they have done differently to prevent this type of error?

This case is a great example of how using Continuous Delivery to automate deployments could have avoided one server being configured differently from any other server. Without automation, every deployment is an opportunity for human error and a chance of breaking the application. Automated deployment and testing for a test environment, staging environment, and production-like environment would have ensured that the change would not have caused this catastrophe.

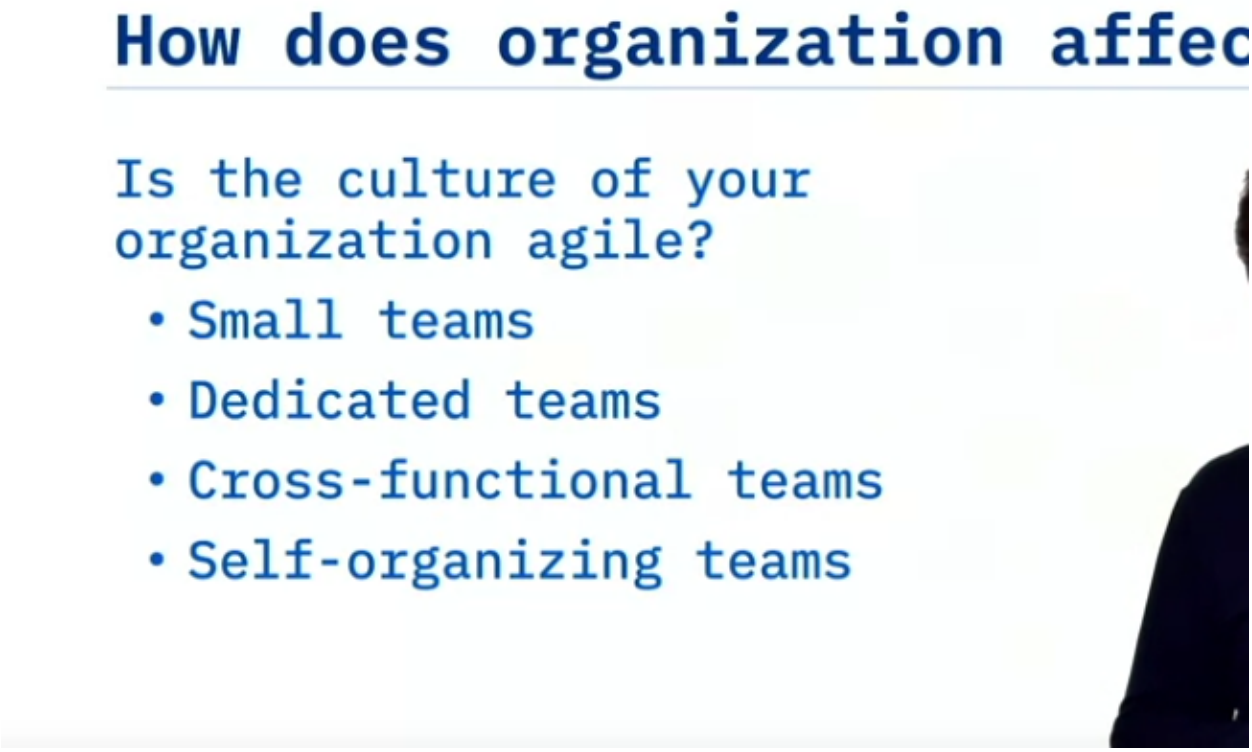
Organizational Impact on Devops

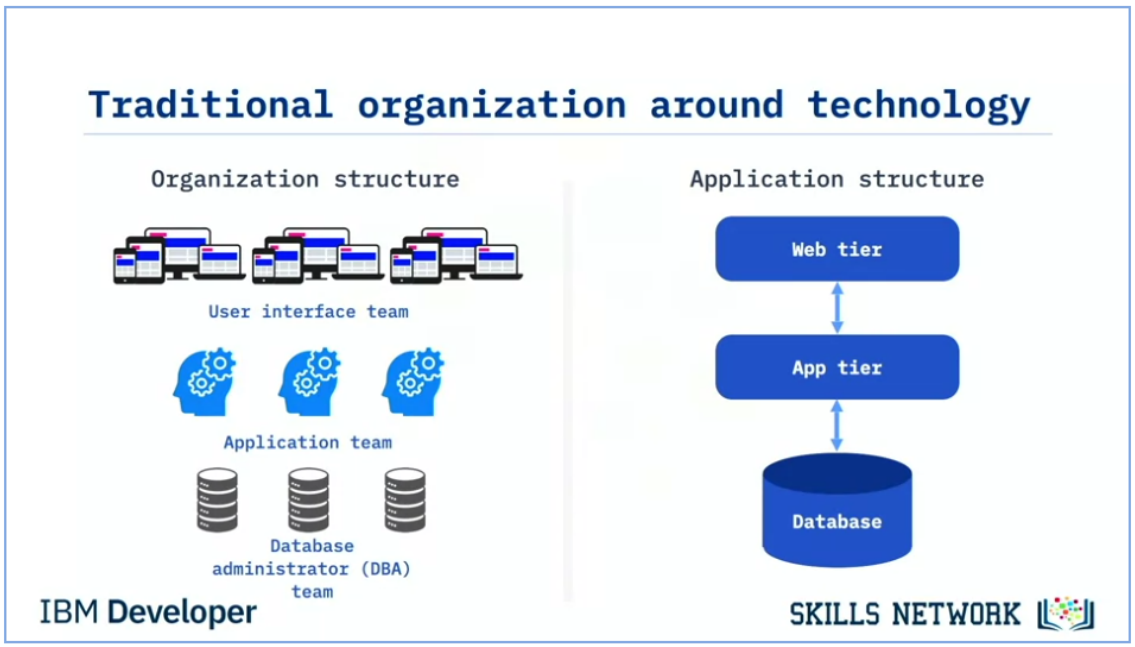
Conway's Law

Which statement illustrates Conway's law?

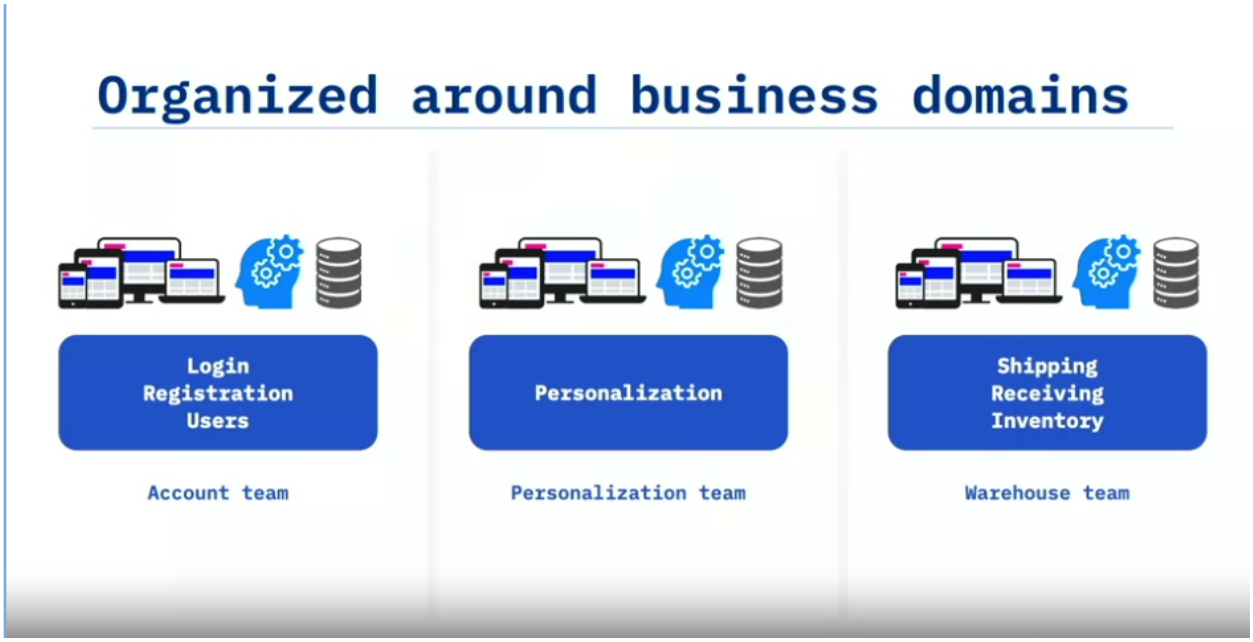
It is good practice to organize teams around what they are expected to produce.

Eg four teams are directed to build a compiler like interface team , application team and database team. I get a 3 tier architecture is called Conway law in action;





Organisation is so important.



Aligned team with business

Each team has it own mission alinged with the business

In team we need engineer aligned around 5-7 not more than 10

End-End responsibility. They commit build deploy buid everything.

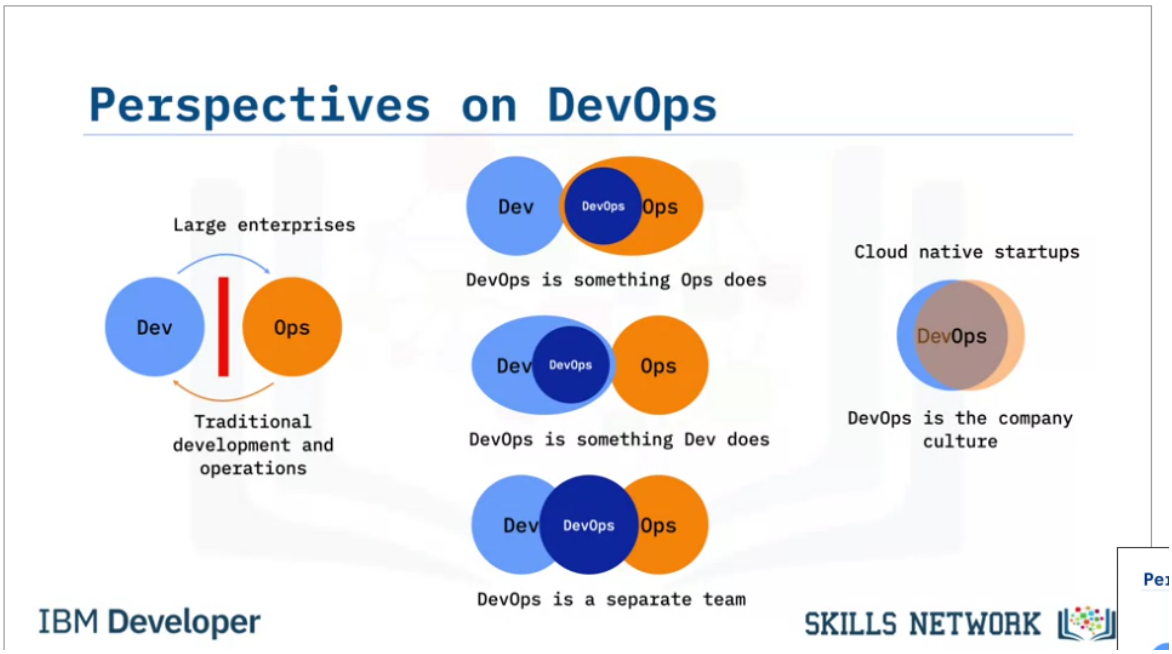
Single business domain in that they have long term vision.

There is no devops team

Devop is development if you are not doing development you are not doing devops, hence you are doing ops. Software engineer practices devops so its a subset of software engineer

Devops is a culture that whole company mindset accept

Notes Discuss

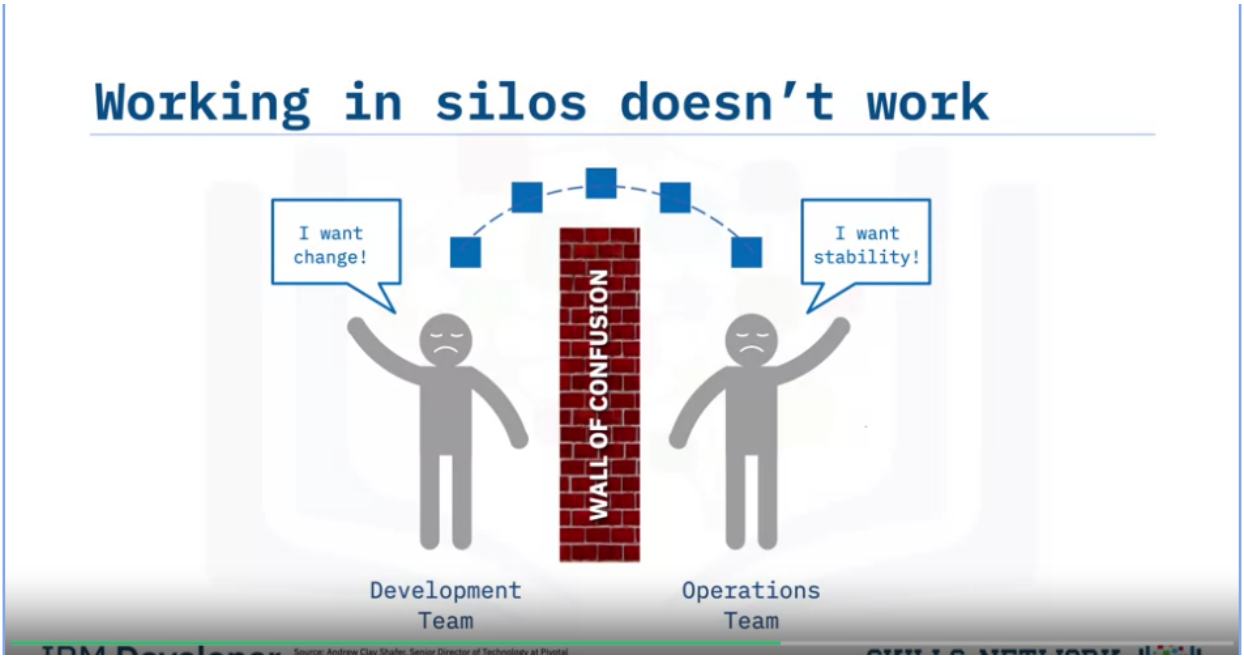


Its a culture for a company.

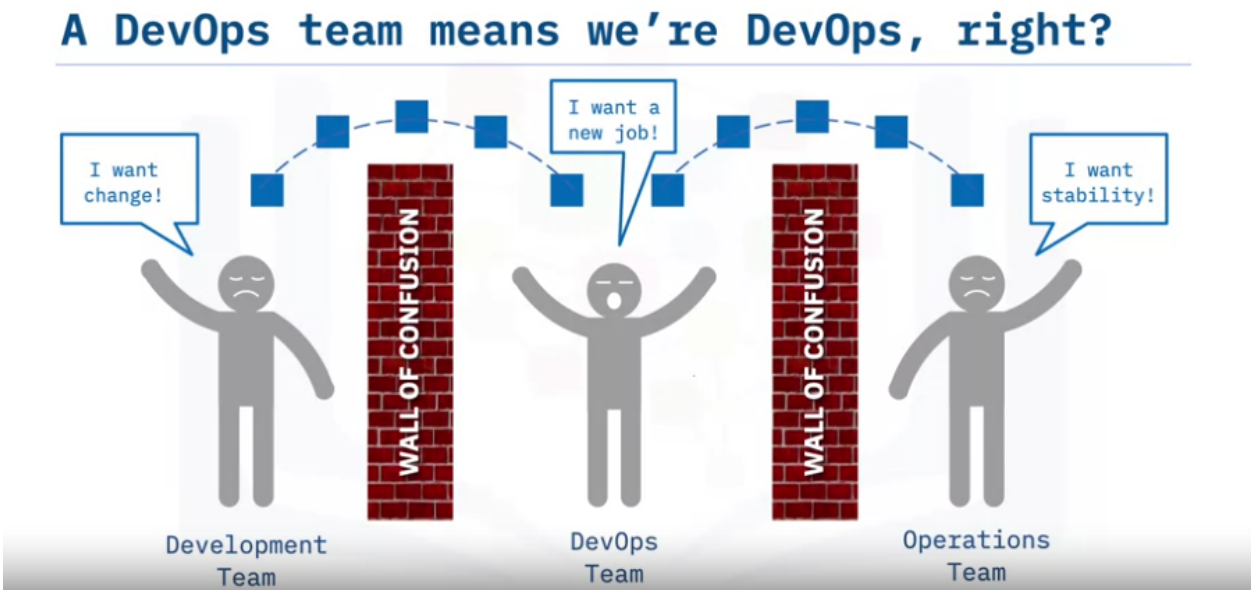
DevOps is not a team

"The DevOps movement addresses the dysfunction that results from organizations composed of functional silos. Thus, creating another functional silo that sits between Dev and Ops is clearly a poor (and ironic) way to try and solve these problems."

Why working in silos never work



Creating a separate devops team



This not at all correct for the coding and devops culture
Creating another silos means creating above mistake again and again

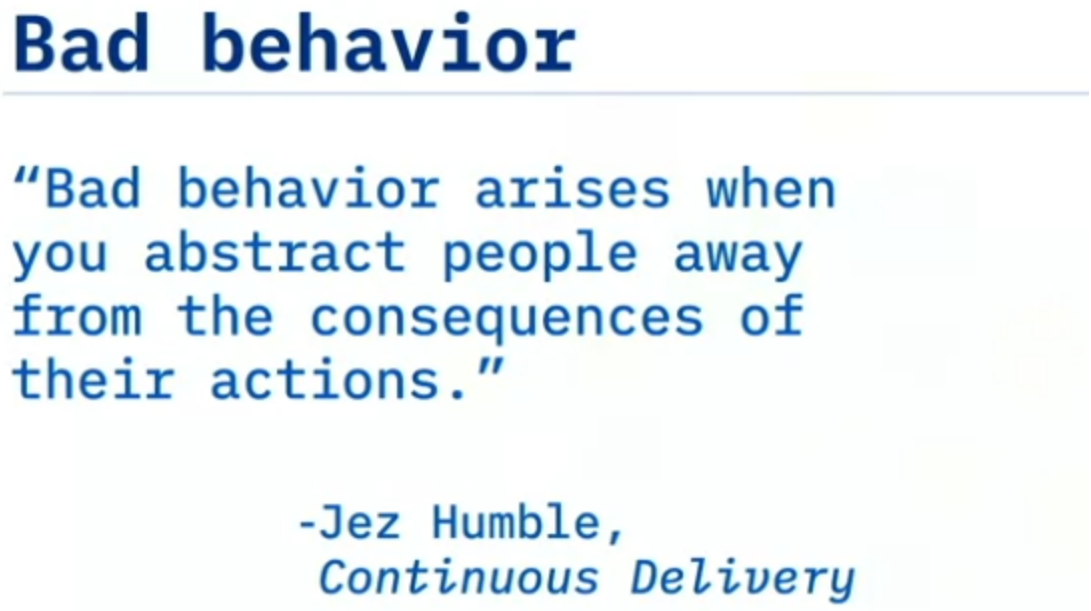
Bad behaviour rises when

- When Devand ops both work in silos then the quality actually decreases

  Action have consequences

- Here are two things that you can do to avoid the problem. You can create cross-functional teams so that everyone is dealing with teammates instead of ticket queues. If you can't create cross-functional teams, then have the developers rotate through the operations so they can feel empathy for what the operations engineers do every day to keep their application running. You can also have the operations engineers join the developer standups and their showcases so that they can understand what the developers are doing.
- Increase there rensponsibilty

Let them the pain of code by recalling them and they will start writing better codes.



Devops orginisational Objectives

Here are two things that you can do to avoid the problem. You can create cross-functional teams so that everyone is dealing with teammates instead of ticket queues. If you can't create cross-functional teams, then have the developers rotate through the operations so they can feel empathy for what the operations engineers do every day to keep their application running. You can also have the operations engineers join the developer standups and their showcases so that they can understand what the developers are doing.

Organizations need to have small, dedicated, cross-functional, self-organizing teams to successfully implement DevOps.

-

Conway's Law implies that a company's design results are a direct reflection of the company's communication structure.

-

Instead of the traditional structure organized around technology, successful DevOps teams should be organized around business domains. Each team should have its own mission that aligns with a business domain.

-

DevOps is a mindset that the whole organization adopts.

-

DevOps solves problems caused by siloed teams.

-

DevOps is the practice of development and operations engineers working together during the entire software lifecycle, following lean and Agile principles that allow them to deliver high-quality results.

-

Actions without consequences can lead to apathy.

-

Allowing teams to feel the effect of their actions fosters empathy, resulting in higher-quality work.

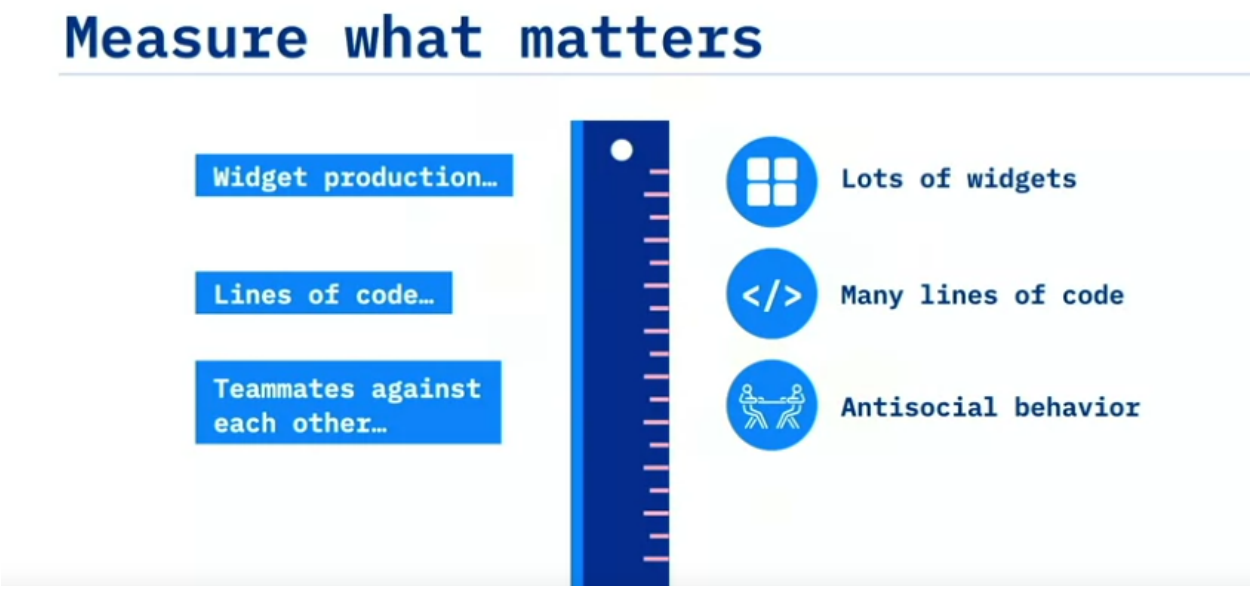
-

- The organizational objective of DevOps is to attain a shared mindset and empower everyone to deliver customer value.

Rewarding for “A” while hoping for “B”

We cannot measure for A nd get B its not going to happen. Like it’s to get what we are actually measure

Measure what matters



Ig you are measuring these remember that you will get these as an outcome .

We need to get social metric to get social bheaviour

Are you building code that the rest of the company or open-source community find valuable enough to reuse in their solutions? But that’s only half of the puzzle. That will get people thinking about how

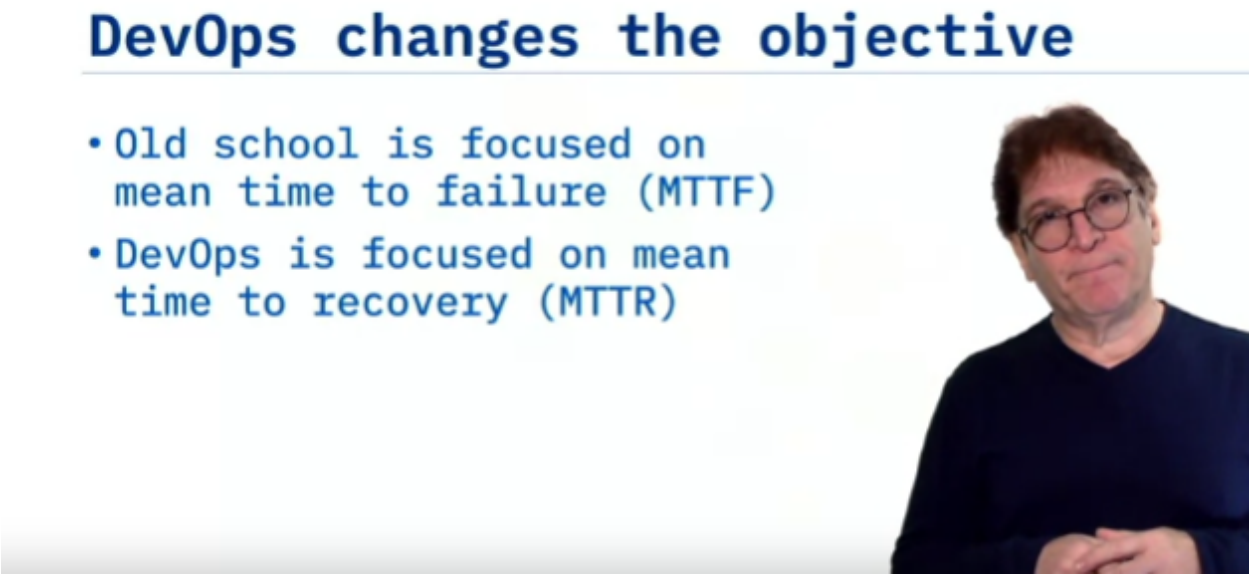
they can make their code valuable to others. But you need the second metric. Whose code are you leveraging? Are you wasting all of my development dollars reinventing wheels or are you leveraging the existing wheels and only building the bespoke parts that don't exist? Both of these metrics are needed because they incentivize both sides to share their code and reuse each other's code because… you get what you measure. You need a social metric to get social behavior.

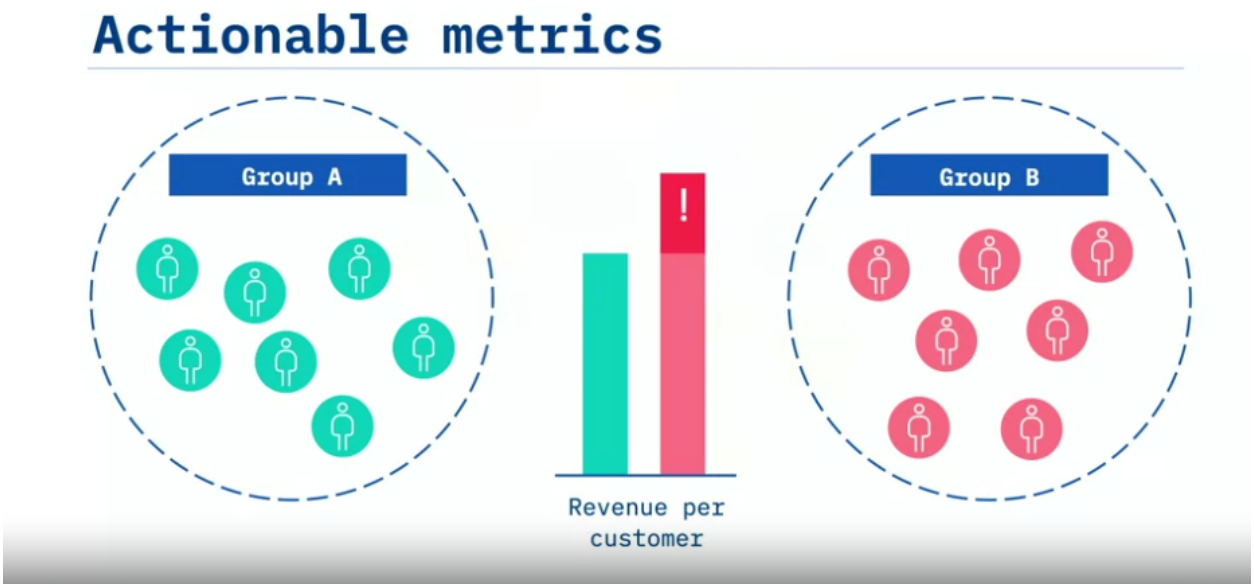
Devops is all about continuous improvement.

Devops metrics

In this base line provides a concrete number for a comparison of as u implement for devops changes

Metric goals allows you to reason about these numbers and judge the success of your progress





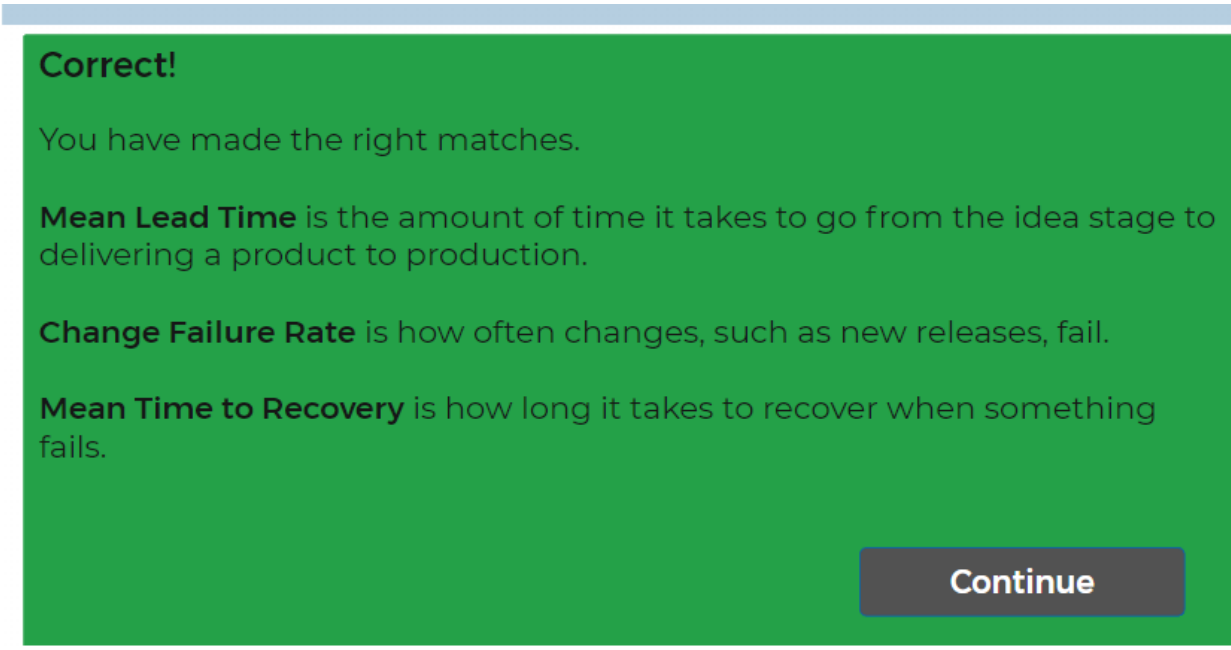
Here a website exposure and outcome is taken in form of data of peoples divided in group a nd group b
Where in group A person is actually knowing interface of website and group b faces new interfaces, which leads to high number of clicks. So this comes under actionable metrics.

example ➖ * Time reduction in market

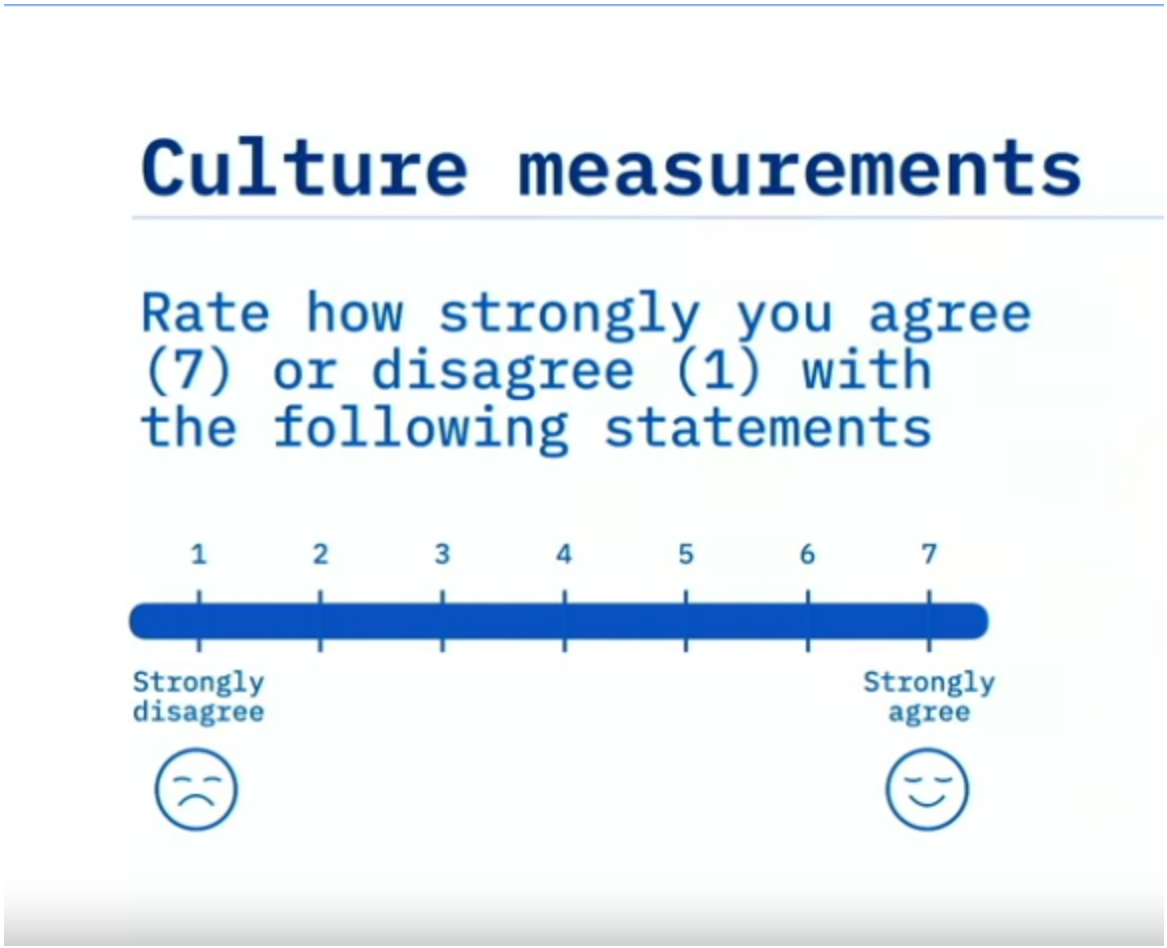
- Increase overall availability
- Reduces time in deployment
- And defects are detected before production.
- More use of hardware infrastructure
- A Quicker performance feedback.

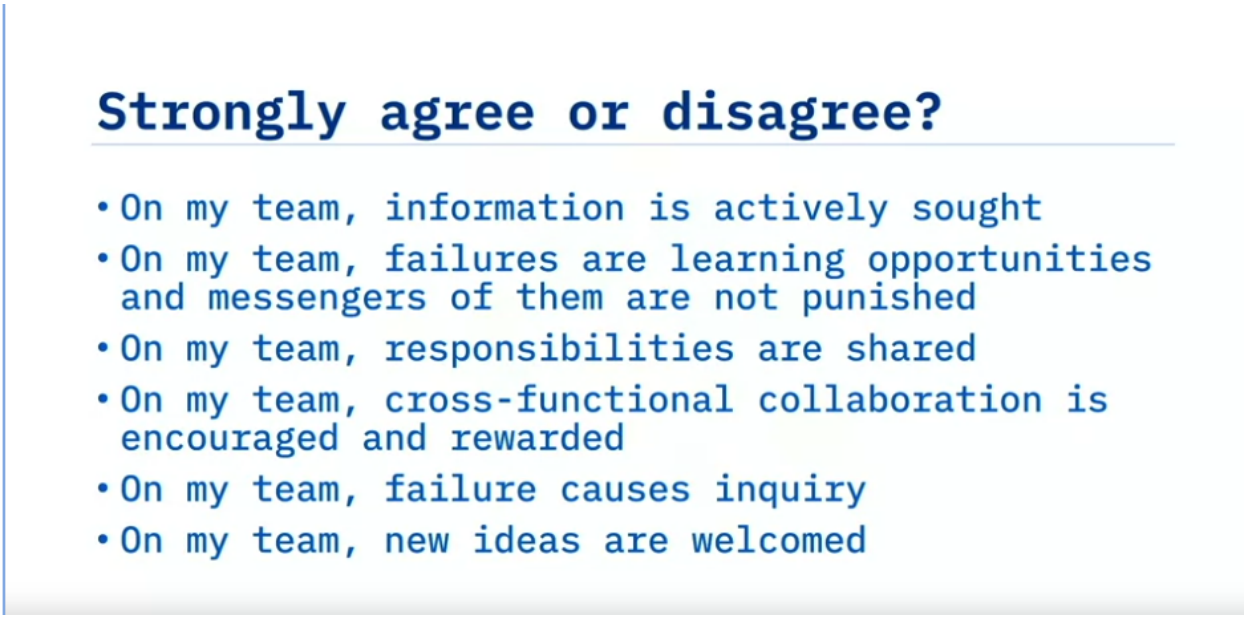
Top four actionable metrices

1. Mean Lead time :- how long it takes to get features in there hand
2. Release frequency :- how quickly i can release things.
3. Change failure rate:-Changes arent failing , Speed is meaning less if doesnt stablises the system.
4. Mean time to recovery (MTTR):-The total time take for the recovery.Fail and it should recover.



How to measure Culture .



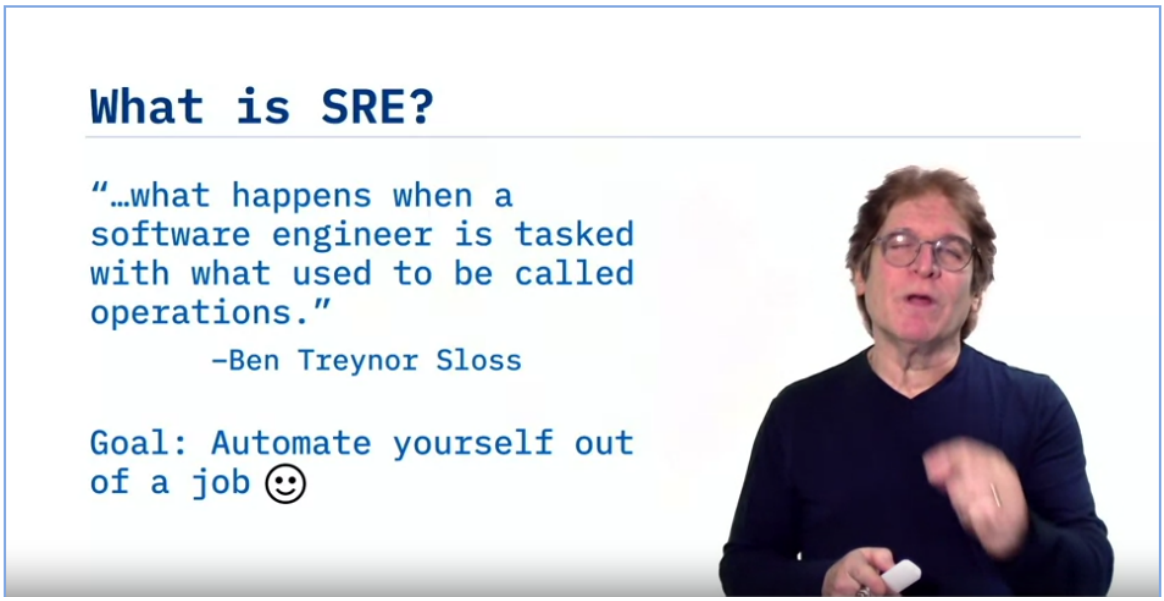


Comparison of Devops to Site Reailibility Engineering

Site reliability Engineering

- What is site reliability Engineering ?
- How does it differ from DEVOPS?
- How can you leverage SRE in a Devops environment ?
- WHat is SRE

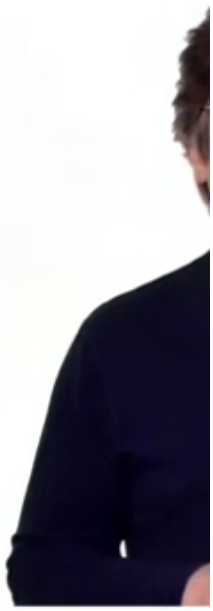
  “What happens when a software engineer is tasked what use to be called operations “



Tenet of SRE

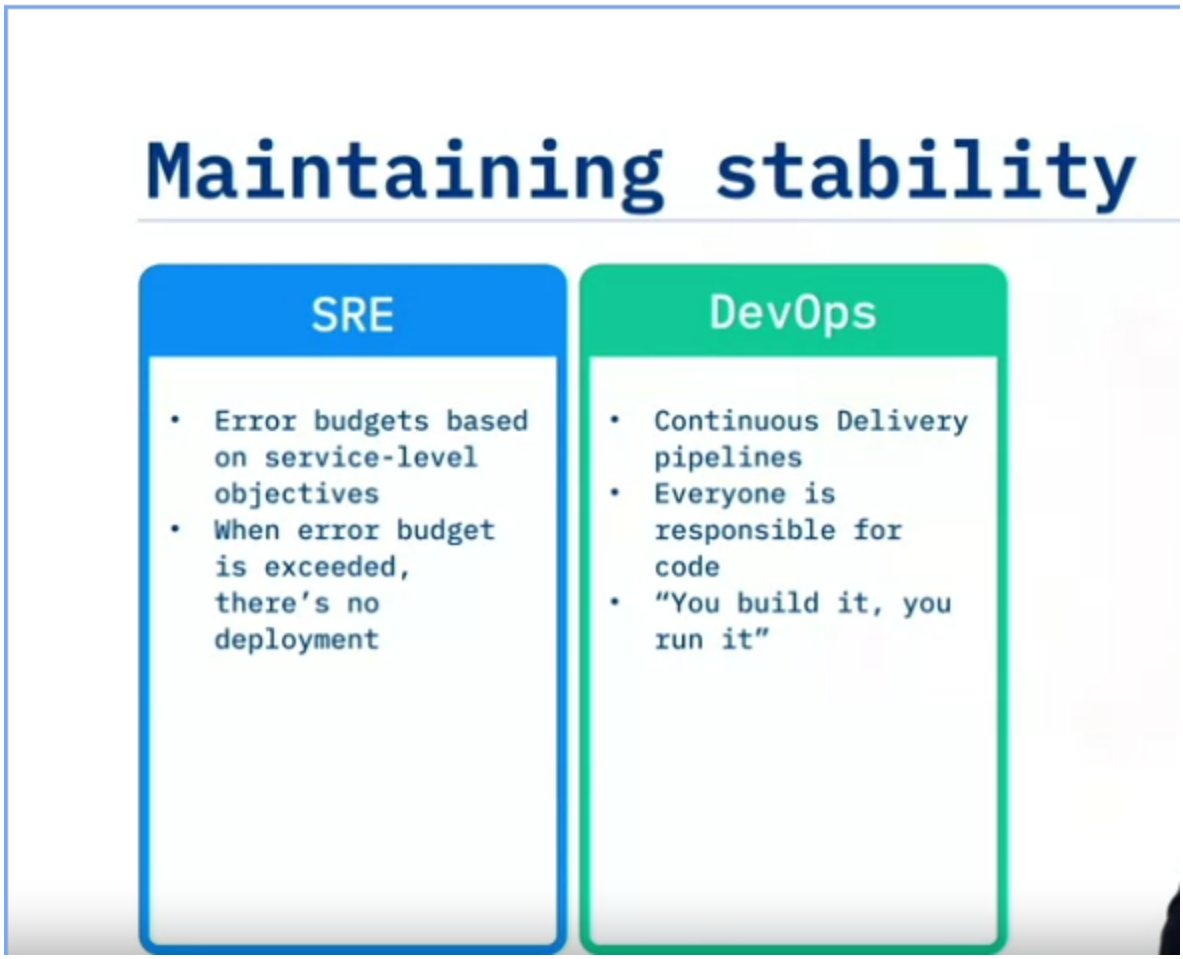
Tenets of SRE

- Hire only software engineers
- Site reliability engineers work on reducing toil through automation
- SRE teams are separate from development teams
- Stability is controlled through error budgets



Team differences

- SRE maintains separate development and operations silos with one staffing pool
- DevOps breaks down the silos into one team with one business objective



SRE

In this we(developers) are responsible for production.

Commonality

- Both are practisinig Dev and ops which is visible to each other
- They both are blameless culture
- The objective of both is to deploy software faster with stability.

SRE+ DEVOPS

Sre maintains the infrastructure

Devops uses the infrastructure to maintain their applications
Sre is the environment who operate the cloud
Devops are the people who are consumin the cloud.