



Oslo Spektrum
November 7 - 9



Sustainable Cloud Migration

Best Practices



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It's so Fluffy

Concepts

Re-Iterate & Extend

Conclusion & Q&A



A Closer Look

Ask the Audience

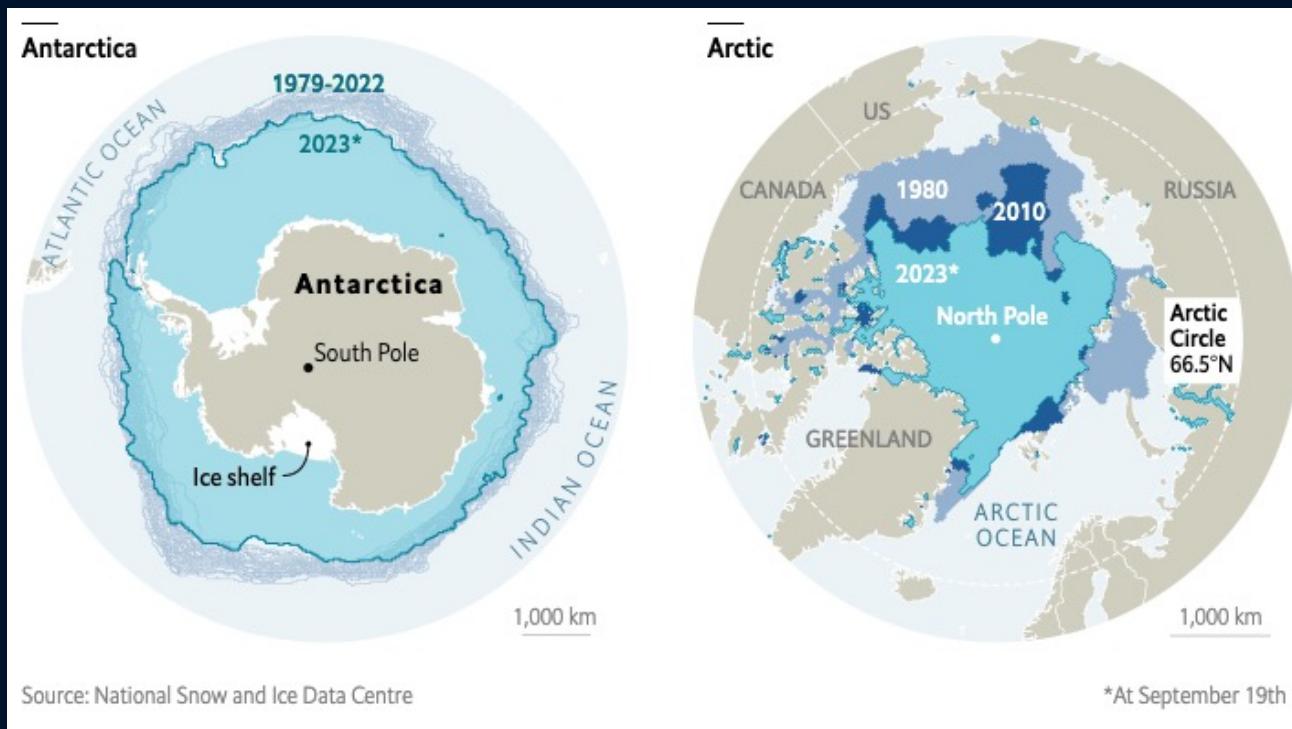
Satellites



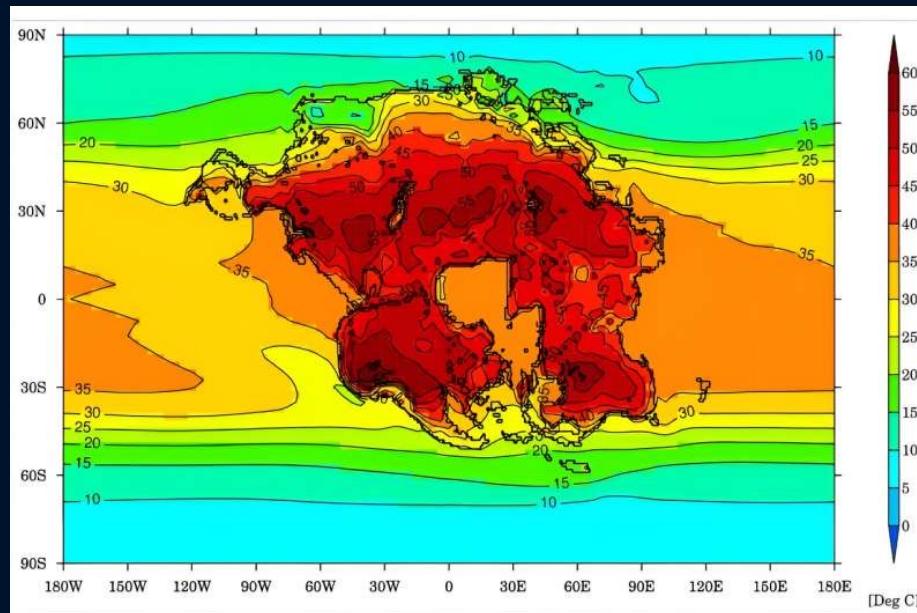
The Imperative of Sustainability

If Nothing Changes, Everything Changes

We Do Not Inherit the Earth from Our Ancestors; **We Borrow It from Our Children**

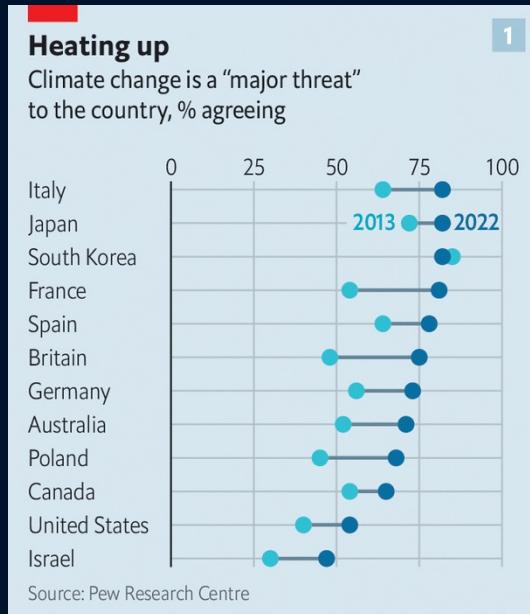


In 250 million years, Pangea Ultima could turn 92% of Earth barren.



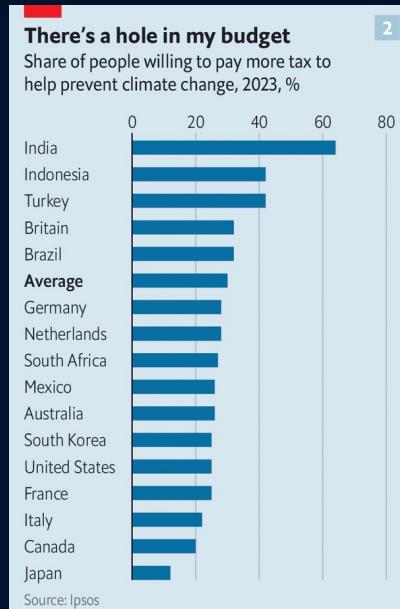
a stark reminder of nature's grand scheme.

The global backlash against climate policies has begun

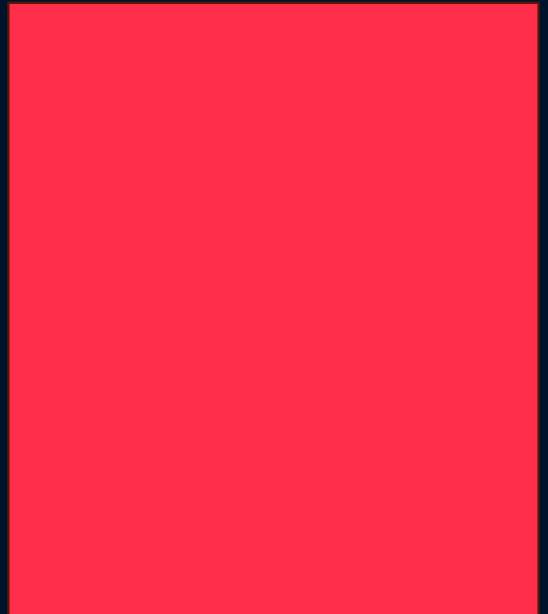


Cost, convenience and conspiracy-mongering undercut support for greenery

The global backlash against climate policies has begun



The global backlash against climate policies has begun



Different planets

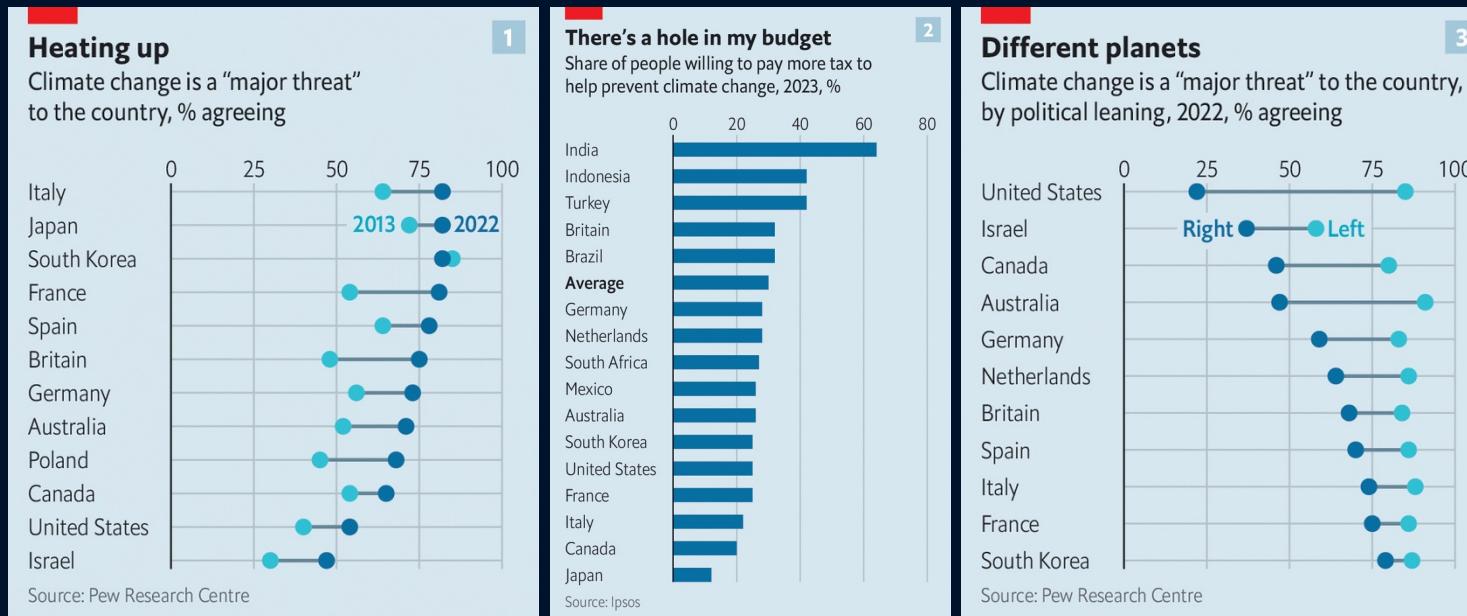
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Climate change is a “major threat” to the country,
by political leaning, 2022, % agreeing



Source: Pew Research Centre

The global backlash against climate policies has begun



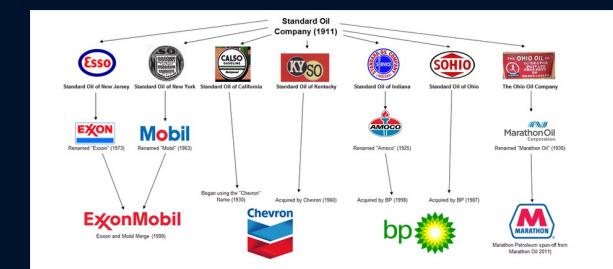
Cost, convenience and conspiracy-mongering undercut support for greenery

Sustainability



Never discover agriculture 10,000 years ago

Rockefeller's Thriftiness



Crude Oil in Rivers
zzz

Laziness

Un-Sustainability

Colonialism
Exploitation

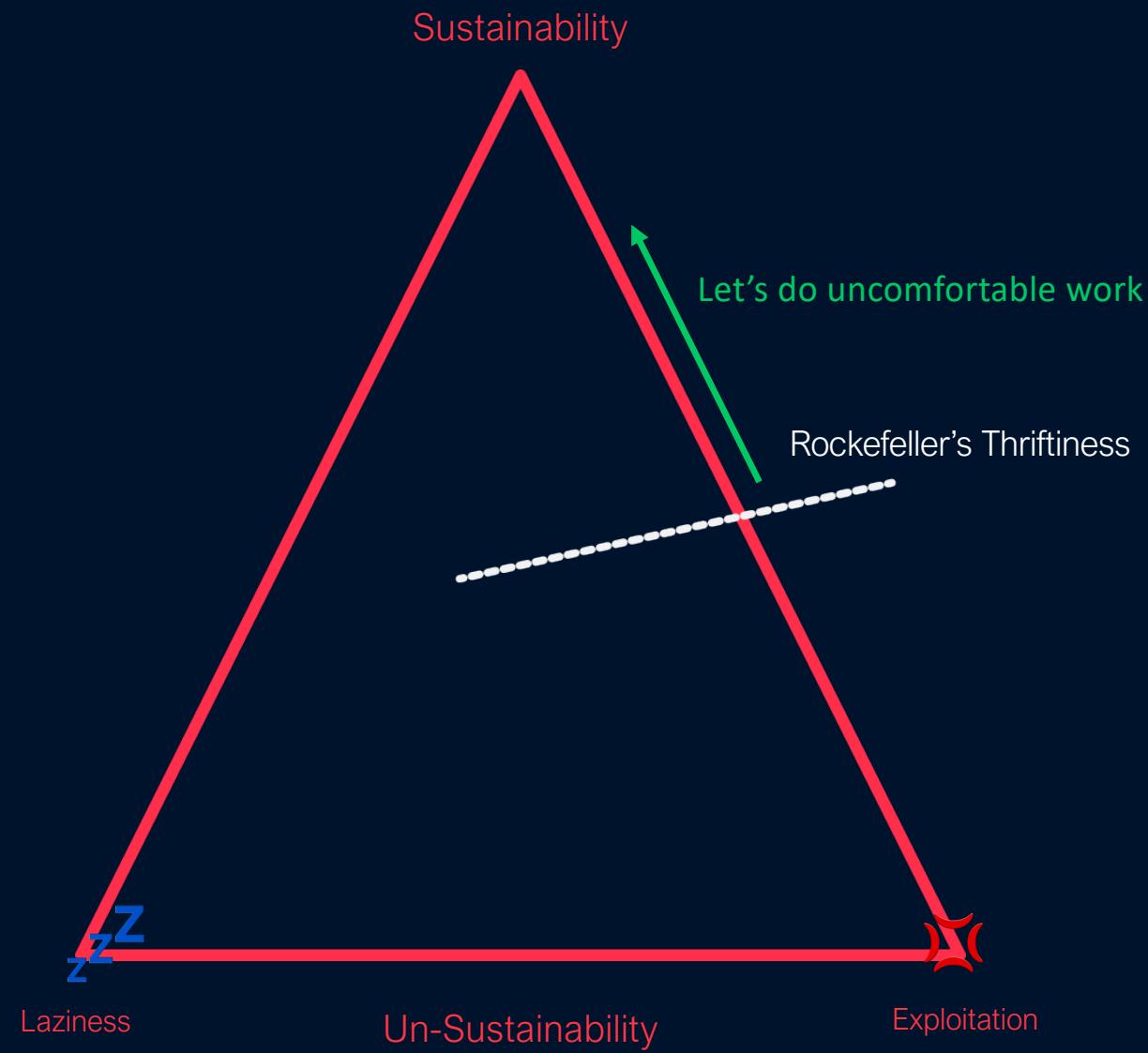


Cloud Sustainability



The discipline of sustainability addresses the long-term environmental, economic, and social impact of your business activities.

We Do Not Inherit the Earth from Our Ancestors; **We Borrow It from Our Children**





Sustainability Scopes in Cloud Migrations

Scope 1: Direct Emissions

Scope 2: Indirect Emissions from Electricity

Scope 3: All Other Indirect Emissions

As users, choosing a cloud provider with strong sustainability commitments can significantly reduce our own Scope 3 emissions.



Where Cloud Providers Stand

Google Cloud:

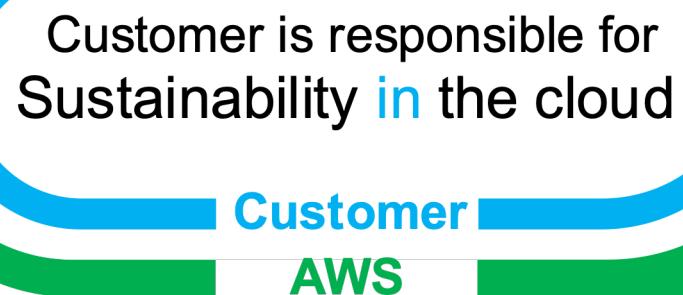
- Committed to operating on carbon-free energy 24/7 by 2030
- Leading in sustainability with active carbon footprint tracking for customers.

AWS:

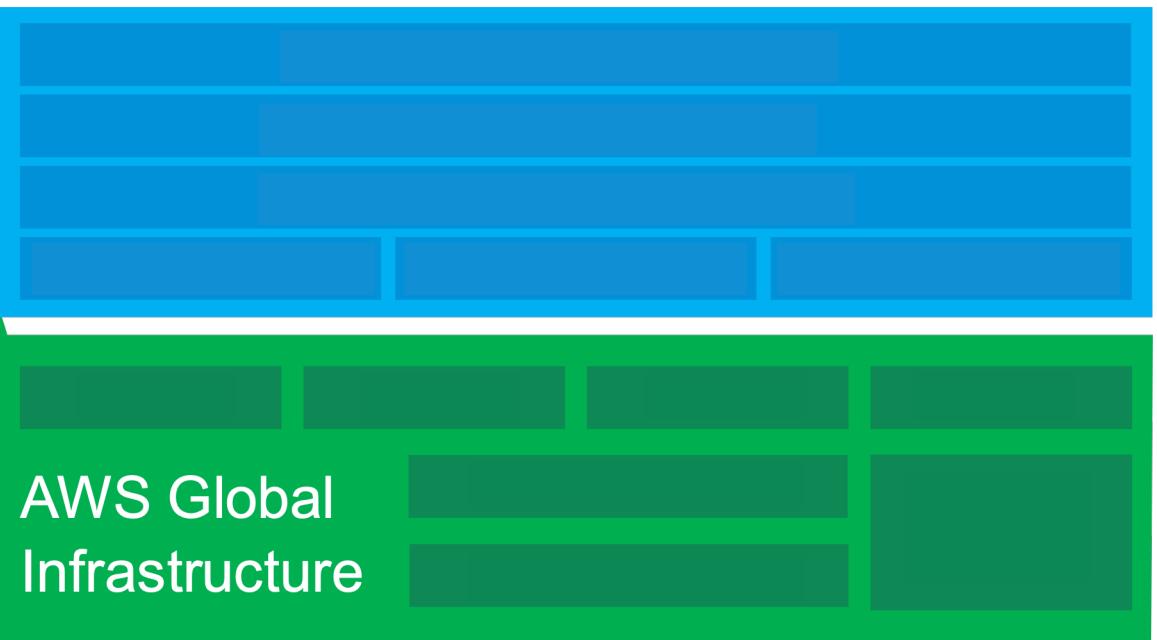
- Largest buyer of renewable energy.
- Plans to power operations with 100% renewable energy by 2025.

Azure:

- Microsoft's commitment to sustainability includes being carbon negative by 2030
- And removing all of their historical emissions by 2050.



AWS is responsible for Sustainability **of** the cloud





Data Storage

We are responsible for optimizing our data storage to ensure efficient use of resources.

For instance, using storage classes like S3 Intelligent-Tiering can automatically move data to the most cost-effective access tier without performance impact or operational overhead.



Code Efficiency

Writing efficient code is crucial for reducing the computational resources required, thereby decreasing the energy consumption of applications.

An example includes refactoring legacy applications to run on serverless architectures like AWS Lambda / Azure Functions, which only uses compute resources when a function is invoked.

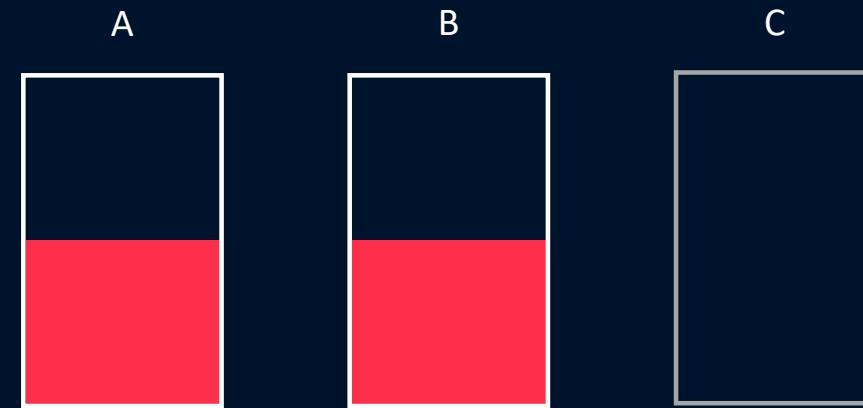


Utilization & Scaling

We must design our systems to scale efficiently in response to demand.

Auto Scaling groups in EC2 can adjust the number of instances automatically, ensuring you have the right number of EC2 instances available to handle the load or your application.

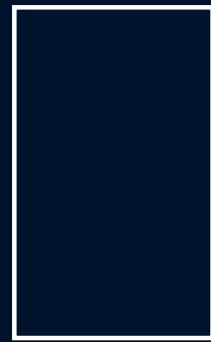
Optimize capacity for sustainability



Running in two zones you need to reserve enough spare capacity
to rapidly switch the load for resilience

Optimize capacity for sustainability

A



B

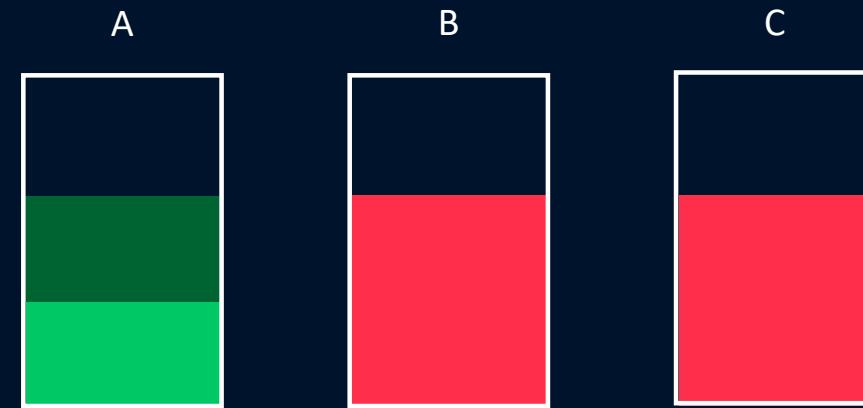


C



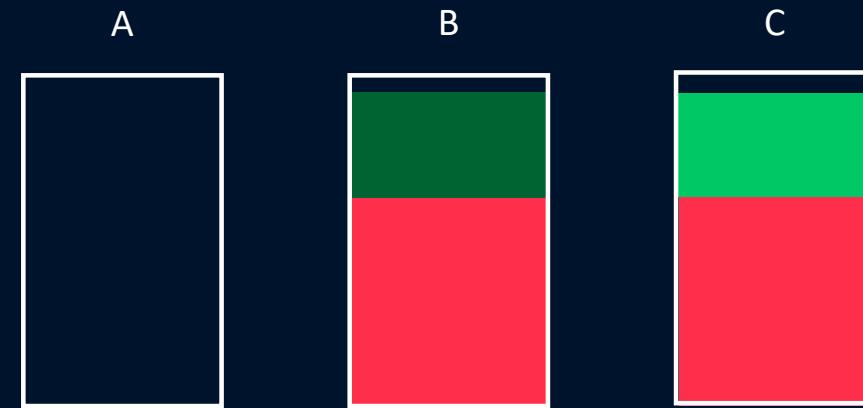
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Running in three zones you need less reserves capacity to switch the load

Optimize capacity for sustainability



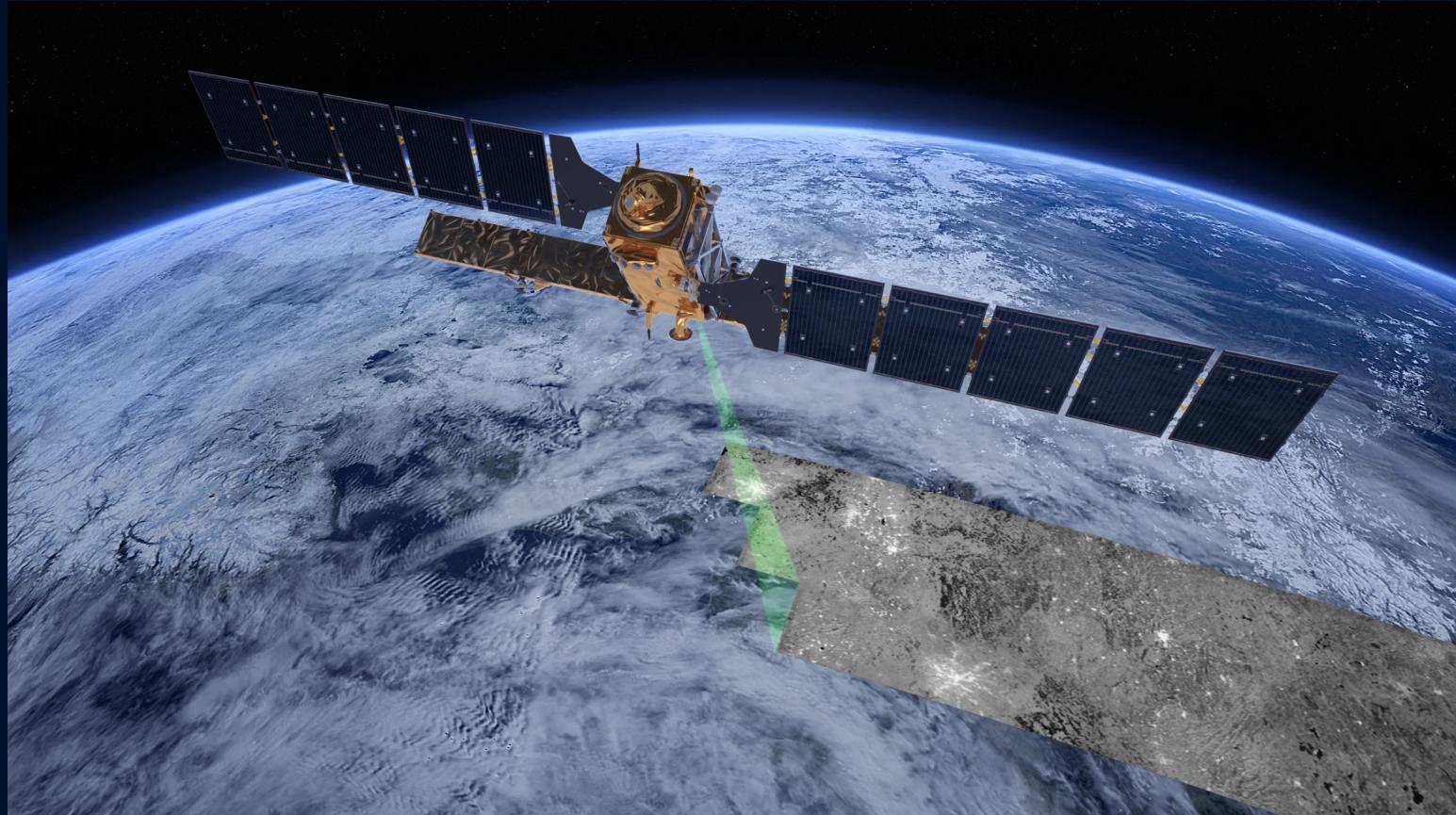
Running in three zones you need less reserves capacity to switch the load



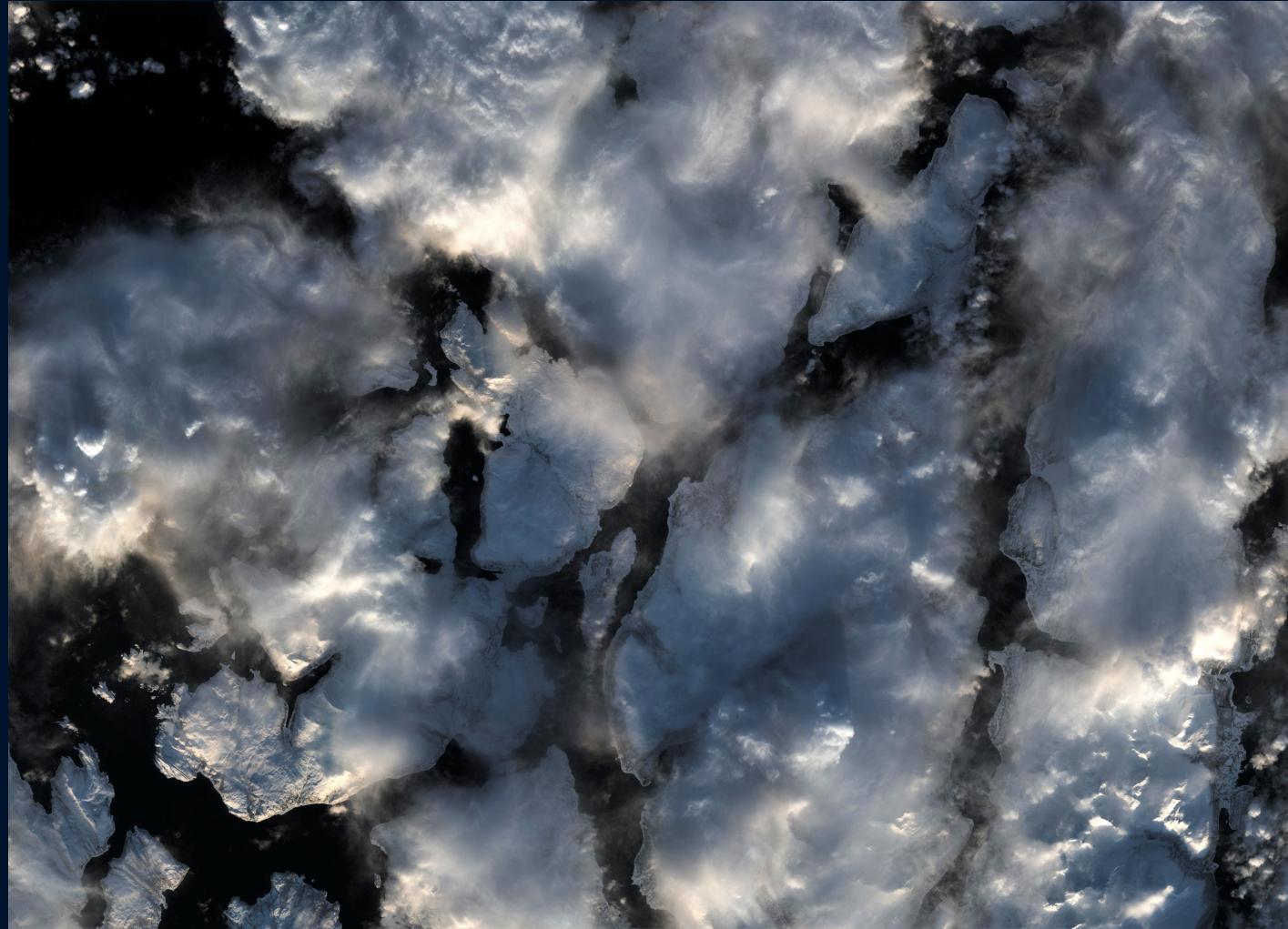
Platform Deployments & Scaling

When deploying platforms, customers should consider sustainable scaling practices.

For example, using containerization with services like ECS or EKS can optimize resource allocation, allowing multiple applications to share the same underlying resources effectively.









Software Application Design

Designing applications with sustainability in mind involves architecting solutions that minimize resource consumption.

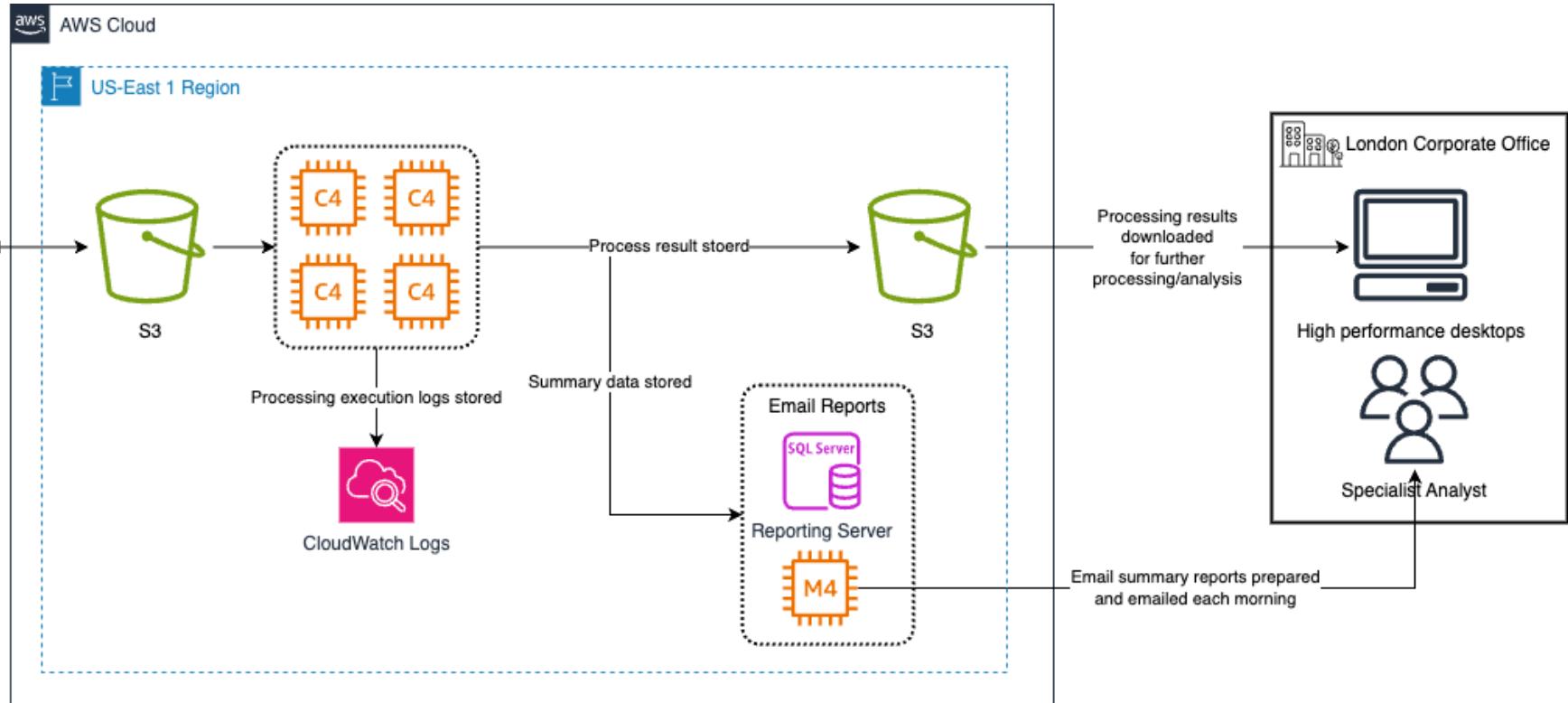
This can involve using event-driven architectures that remain idle until a certain event triggers a computation process.



Data Design & Usage

We are tasked with designing data usage patterns that are sustainable.

Implement a data classification policy to identify data that is infrequently accessed can can help it move to colder storage options such as S3 Glacier, reducing storage costs and energy consumption.



The X Renewable business unit daily collects operational data from its European wind farms through a third-party service. This data is merged with their own, then processed on a powerful computing system using traditional custom-built software. Specialists analyze the processed data on high-performance graphics workstations. Furthermore, the team produces daily reports and distributes them via email to the staff.

Pillar for Sustainability

Understand environmental impacts of the services used

Quantify impacts through the entire workload lifecycle

Apply best practices to reduce these impacts





User behavior patterns

Scale infrastructure with user load

Align service level agreements (SLAs) with sustainability goals

Eliminate the creation and maintenance of unused assets

Optimize the geographic placement of your workloads for user locations

Optimize team member resources for the activities performed



Software patterns

Optimize software architecture for asynchronous and scheduled jobs

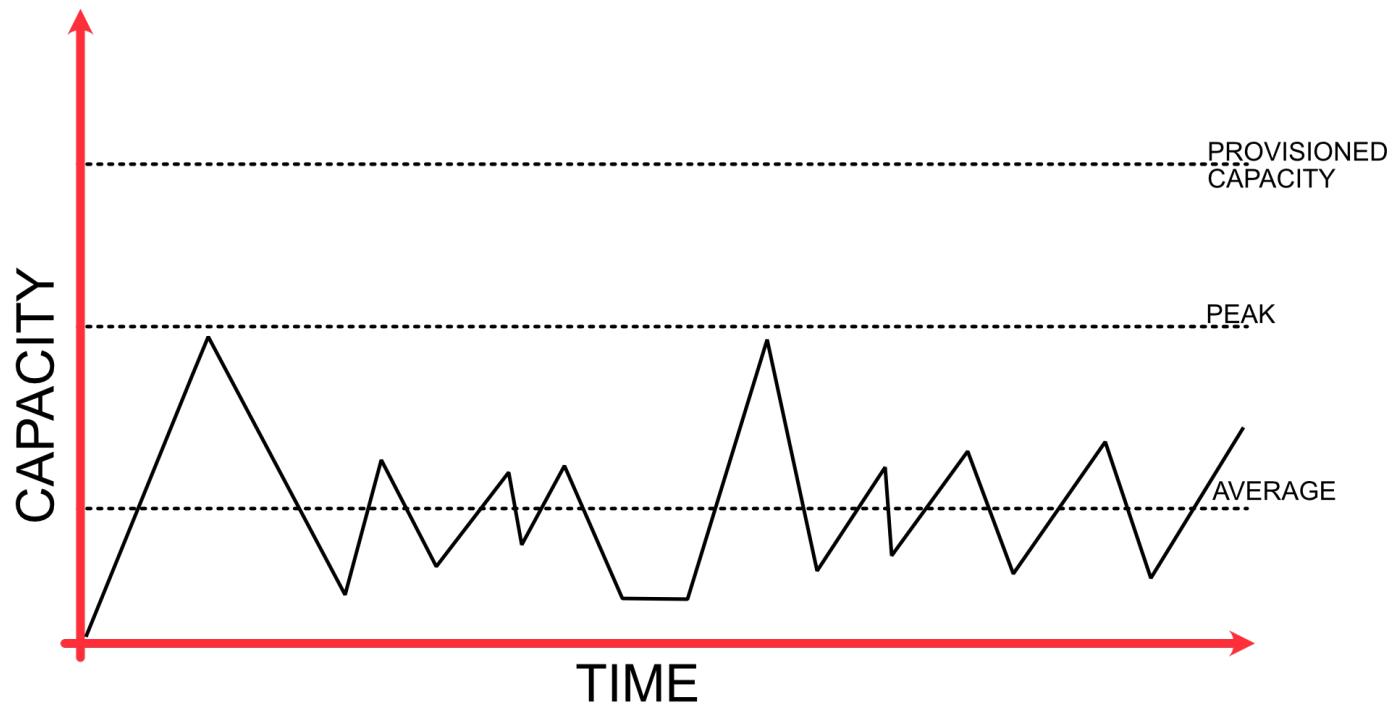
Remove or refactor workload components with low or no use

Optimize the areas of your code that consume the most time or resources

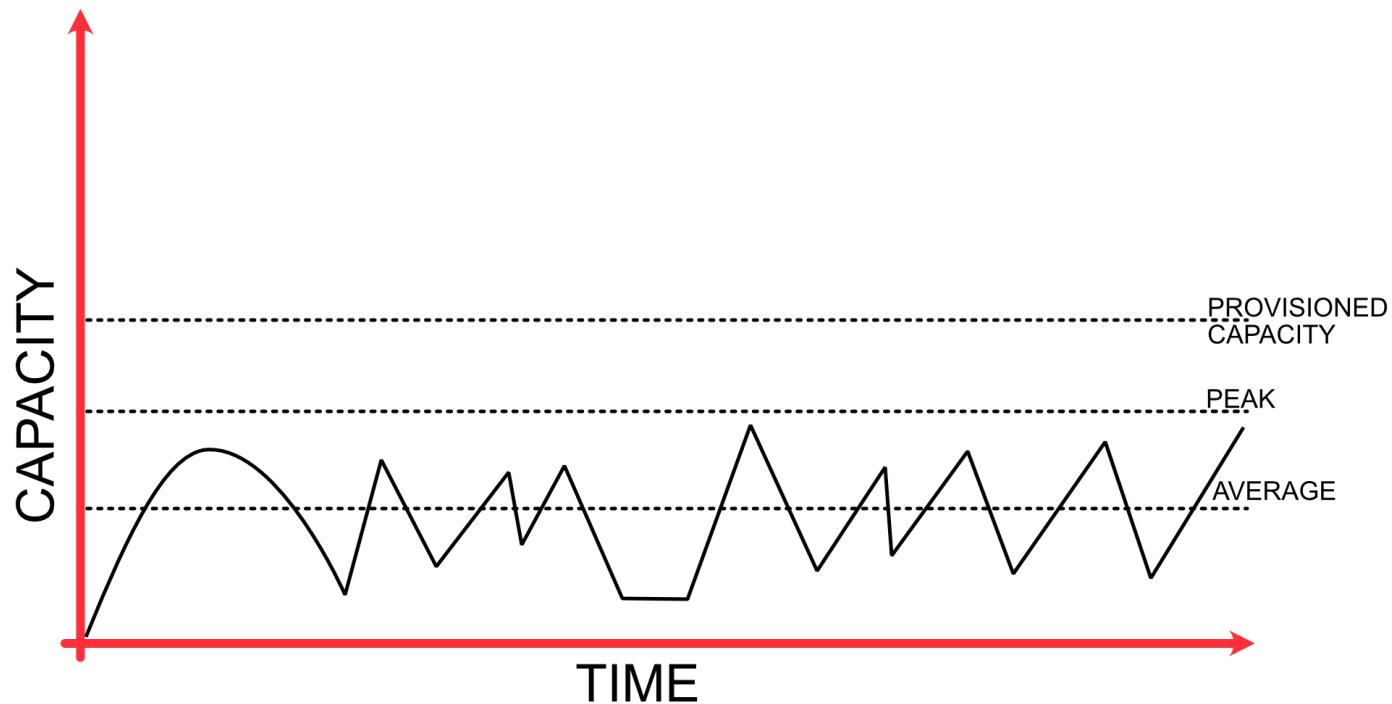
Optimize impact on customer devices and equipment

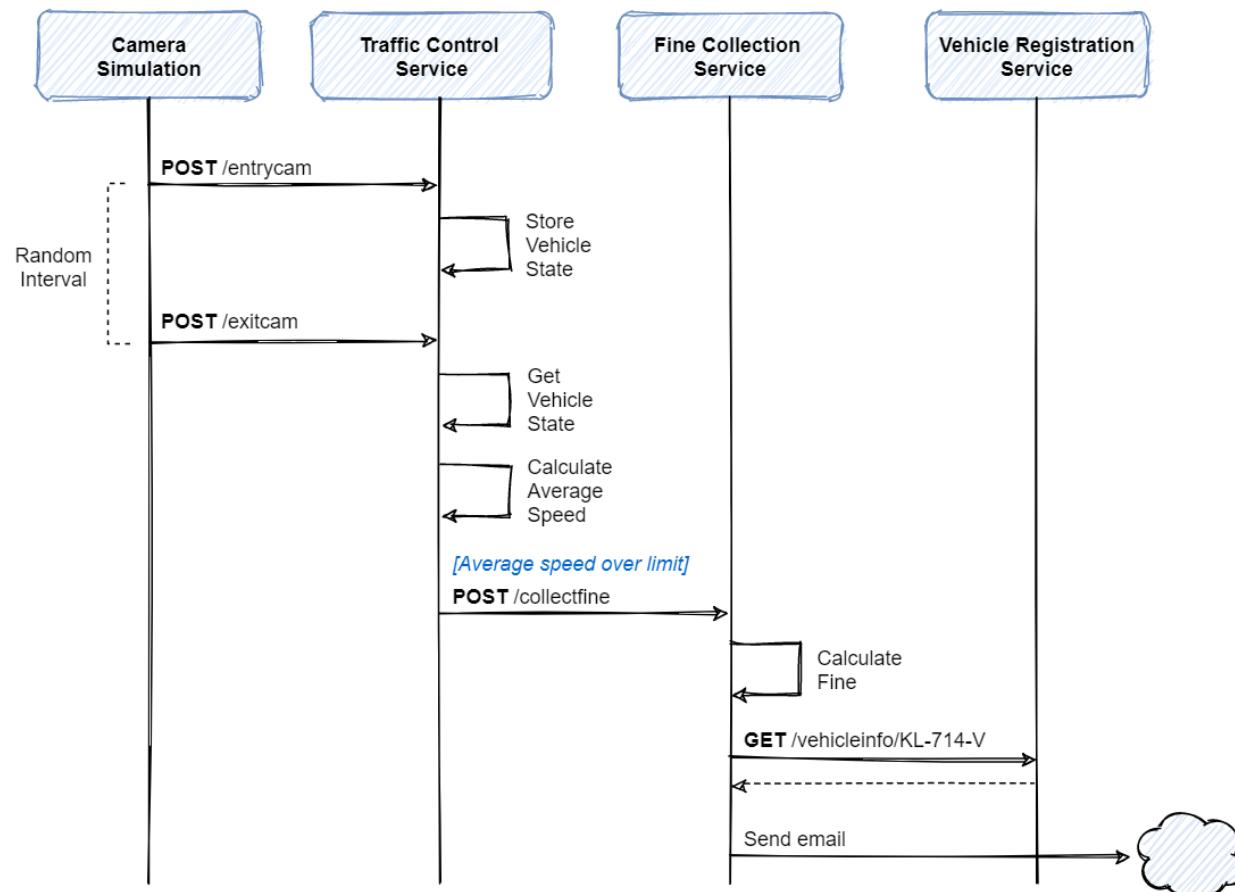
Use software patterns and architectures that best support your data access and storage patterns

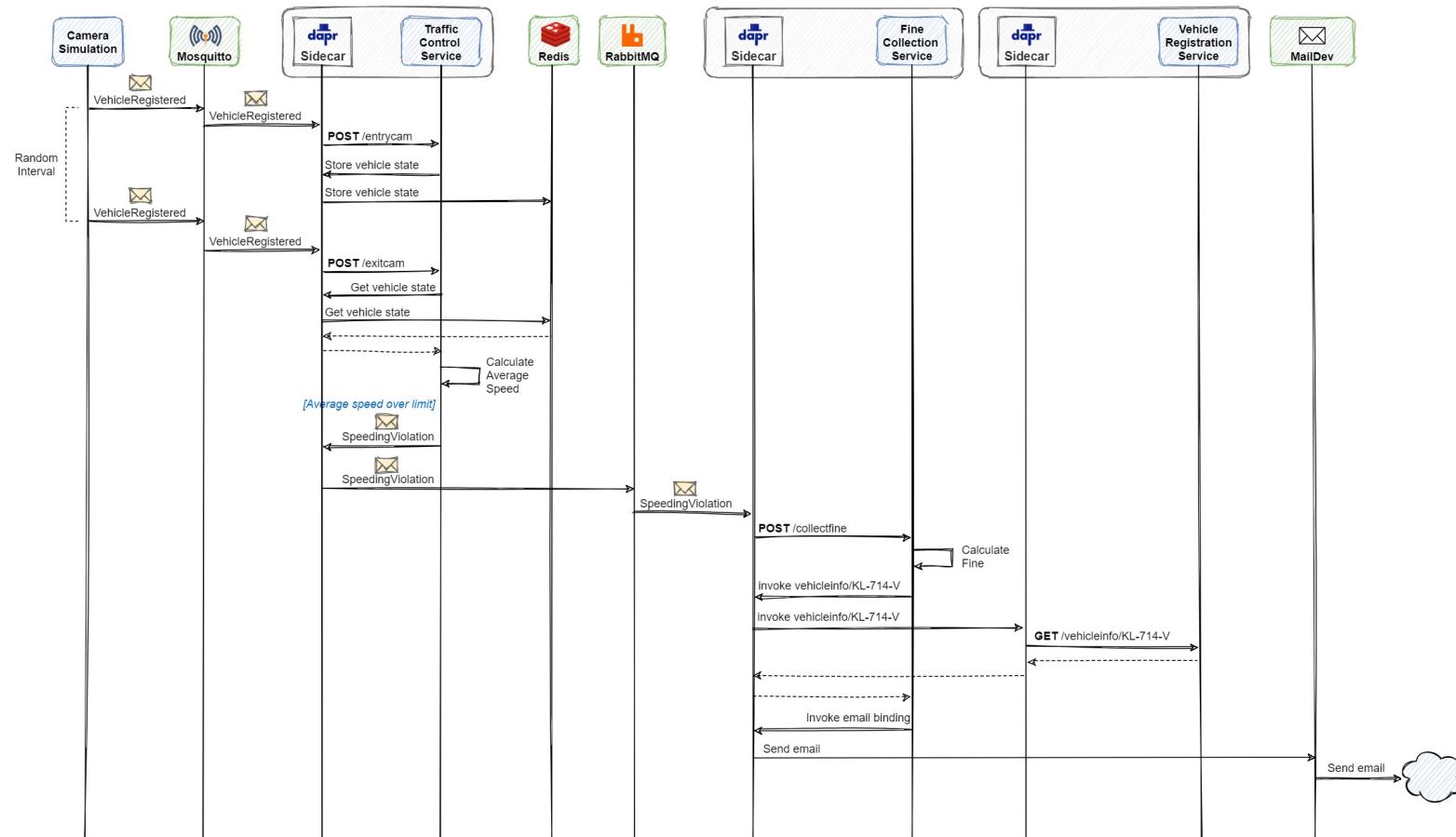
Impact depends on total provisioned capacity, not average utilization



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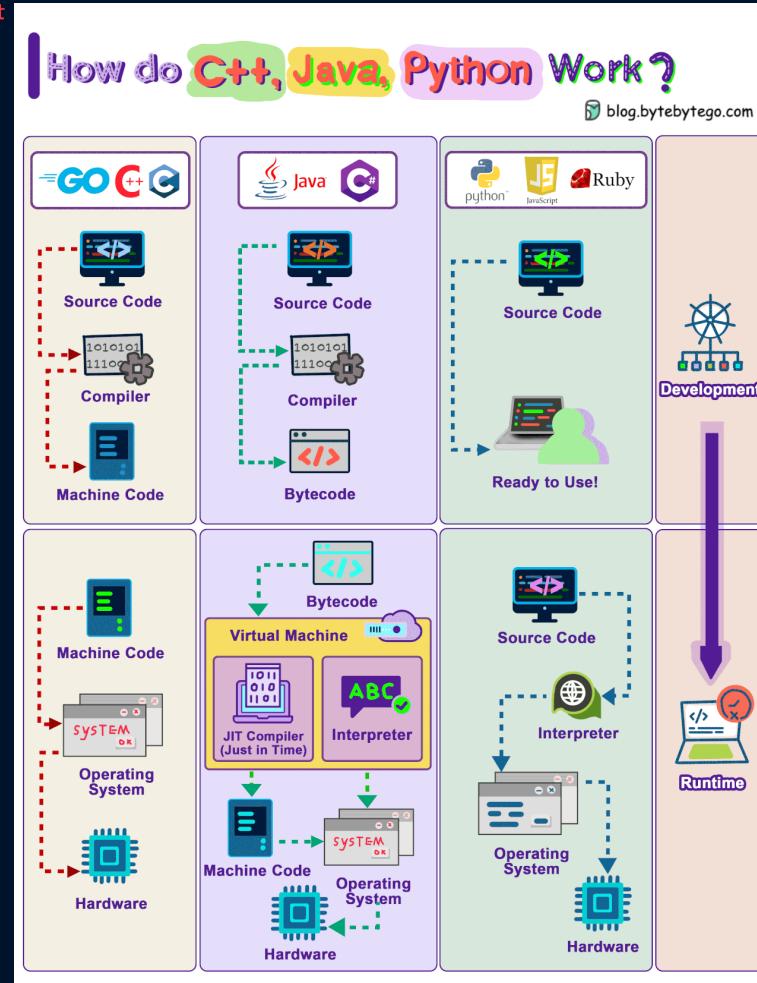
Hardware patterns

Use the minimum amount of hardware to meet your needs

Use the instances types that meet your requirements with the least impact

Use managed services

Optimize your use of GPUs



Operations

- Higher Utilization
- Automation
- Relax over-specified requirements
- Archive and delete sooner
- Deduplicate data
- Choose times and locations carefully



Development and deployment process

Rapid Introduction of Sustainability Improvements, think agile and CI/CD

Keeping Workloads Up-to-date

Optimize the use of Continuous Integration environments

Managed Device Farms for Testing



Honorable Mention

- Microservices using Kubernetes Services (EKS, AKS)
- Serverless Computing (Lambda, Functions)
- Cost Management
- Advisors
- CI/CD Pipeline using GitHub Actions
- Carbon Footprint Calculations
- Monitor Energy Consumptions



Honorable Mention

- Track Resource Utilization
- Cost Analysis
- Set Sustainability Goals
- External Certifications



How you do anything is how you do everything

Scan that QA code