

Case Study

Microsoft Office 365 Availability Protection Service

Office 365 serves over 100 million users, storing their emails, documents, and other important data while maintaining high availability through replication across data centers. The Availability Protection Service (APS) is a hybrid cloud and on-prem system tasked with ensuring that software and updates that run on the 400 thousand machines in these data centers don't affect users' ability to get to their information when they need it. The APS also runs with stringent requirements against allowing direct modifications to data center machines unless those changes pass through a series of checks, making it difficult to debug issues when they do come up. These requirements help protect the privacy and integrity of users' data.



Rearchitecting a global distributed service

The Office 365 team was planning to rebuild key parts of the APS to help it scale better for future growth, which would have involved spending engineering cycles on writing code to handle retries and failure. Instead of building this from scratch, the team decided to rebuild on top of [AMBROSIA](#), allowing them to focus on the core logic of orchestrating workflows across globally distributed datacenters. With AMBROSIA, the new system will consist of service code running in fault-tolerant "Immortals" with instances across hundreds of nodes to fetch new workflows and schedule them accordingly. As a result, the new service code will be significantly simplified and easier to maintain while AMBROSIA provides reliable communication between components with exactly once semantics.

Advantages of developing on AMBROSIA

Reliable communication between distributed components

AMBROSIA automatically handles recovery from failures and ensures exactly once semantics between Immortal components.

Replayable logs and debuggability

Get time-travel debugging by replaying through logs after a failure. Office 365 uses this to isolate and simulate failures that occur on data center machines that can't be accessed directly.

Performance and Scalability

AMBROSIA's programming model provides performant resiliency on par with RPC frameworks that provide fewer guarantees. This approach is also highly scalable, making it ideal for commonly used microservice architectures.