EBOOK

Building A Cloud Aware Enterprise

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Three Steps to Defining a Cloud-First Strategy

MATT BROWN
Executive Director, NetApp on NetApp

As NetApp's business goals evolve, so must IT. We constantly look at ways to streamline IT processes to become more efficient in terms of cost and agility. When we looked to the cloud as a possible solution, we discovered the real conversation has evolved from "to cloud or not to cloud?" to "how to cloud and why."

Inside NetApp IT we previously looked at the cloud as a static end state where apps were placed in the cloud on an individual basis. We then realized that we could leverage the cloud in a far more dynamic way. A dynamic strategy enables us to move apps in, out, and within clouds; adjust our course as workloads and factors change; and continually evaluate what apps are in the cloud and why. Our strategy is based on a blend of private and public clouds (which includes SaaS providers) and aims to eliminate the legacy data center concept.

One of the biggest mistakes an IT shop can make is to manage the cloud as if it were a project with an end date. IT organizations must acknowledge that they need the cloud as part of their new operating model. Adopting this new model requires thoughtful planning in terms of agility, scalability, and supportability. Below we offer an approach to starting your own cloud journey.

Next Stop: Cloud

Many CIOs I talk with ask me why NetApp IT decided to move to the cloud. My response is that all enterprises need to go to the cloud, whether it is private, public/SaaS or, most likely, a blend of all three. NetApp IT sees the cloud as enabling the agility to maximize technology investments, deliver business capabilities more rapidly, ensure greater supportability, and enhance the ability to leverage future technologies and IT services.

NetApp IT Cloud Decision Framework

A process for placing enterprise apps in the public or private cloud

Our Applications Categorization

Based on Gartner Pace-Layering Methodology

Systems of Differentiation	Systems of Record	Systems of Innovation	Commodity Services
Denotes apps critical to the company's competitive advantage in the marketplace	Represents apps that are single source of truth for data sets of information	Exploits new opportunities in the market or improve internal efficiencies, i.e. fail-fast, POC testing	Any software that is used corporate-wide
NetApp AutoSupport	Revenue Recognition Installed Product Base	New tech/apps features & functionalities	Email Collaboration

Core competency becomes the foundation of your cloud decision framework.

With the goal that all applications will end up in a cloud, we needed a framework to guide those decisions. A cloud decision framework is how we incorporated the cloud into the evolution of our daily operations. NetApp IT seeks to maintain flexibility in the cloud without vendor lock-in to meet the ever-changing needs of the business and maintain a competitive advantage. The framework addresses cloud placement for new apps and the evolution of legacy apps to the cloud.

In this eBook, we will discuss the development of our cloud decision framework to transition IT from a traditional operating model to one that is cloud-aware. We start with our first step:

Recognize that you're already in the cloud and learn from it.
Many IT organizations see the cloud as new technology when the reality is that they are already leveraging cloud-based SaaS business services, such as payroll, HR benefits, lead generation, and the help desk, which have been common cloud services for decades. It is also likely your business is using the cloud without IT involvement. Examples can be found in marketing, finance, and sales.

The goal here is to learn why your organization chose to use SaaS, validate that criteria, and then apply it to the rest of your application environment. More than likely you've chosen SaaS because the apps/services were not core to your company's competencies. Core competency becomes the foundation of your cloud decision framework.

Develop your cloud decision framework.
You will need a cloud decision framework to standardize and bring consistency to your delivery and operational process for the cloud. We recognized that core competency was an output of the first assessment. Now let's table that for a moment to ensure we can apply that criteria in the most meaningful way possible to your entire application portfolio.

In our environment, we were already using the Gartner Pace Layering methodology for IT governance to prioritize technology investments. We recognized it could also help us define our cloud decision framework and prioritize the order of cloud adoption. This methodology offers a structured approach based on roles that the applications play in the business, based on three categories. We added a fourth category called

Commodity that captures common-use desktop- or service-based applications throughout the corporation. These categories are:

- **Systems of Record -**These apps are the single source of truth for data sets of information. Examples include payroll, revenue recognition, installed base, etc.
- **Systems of Differentiation –** These apps are critical to the company's competitive advantage in the marketplace. One example is NetApp AutoSupport™ (ASUP™), our proprietary customer support system.
- **Systems of Innovation –** These apps are developed to exploit new opportunities in the market or improve internal efficiencies and require a fail-fast, proof-of-concept approach for testing new capabilities. The objective is to decide about investing in them as fast as possible.
- **Commodity Systems –** Any software that is used corporatewide. This includes email, help desk, collaboration, office tools, and web conferencing.

Place your apps into categories.

Now that you understand the classifications, the next step is to place your IT-supported apps into one of the four categories. This process should be simple and take only a couple of hours. This is not a detailed exercise. The goal here is to identify the first categories of focus in the simplest way possible.

For NetApp IT, the first logical focus was on our commodity systems and systems of innovation. Commodity systems are not a core competency and should already be in the cloud. NetApp IT is taking a very aggressive approach to making this a reality.

As you move commodity and innovation systems to the cloud, you will recognize that systems of record and differentiation are more complex to analyze. This is because these systems are legacy systems for most companies. These systems are usually highly customized and highly integrated, with very specific proprietary features. They should be part of your private cloud storage.

Many of the applications categorized as systems of record are not a core competency and should be evaluated against all your working business requirements to make a final determination for placement. As you go through this exercise, you will discover many of these systems will be candidates for SaaS-based soluations.

Now that you have these categories, you can start developing your policies, such as requiring that all new apps be cloud-ready, with no proprietary constraints or customizations.

Supporting Business Agility

The cloud-decision framework is an effective tool for IT to standardize its approach for supporting core vs. non-core systems and utilizing the cloud as part of a dynamic hybrid cloud strategy. Just as importantly, the framework is a solid foundation for NetApp IT to evolve from a technology provider to a broker of services. ■

Building a Cloud Aware Enterprise Inside NetApp

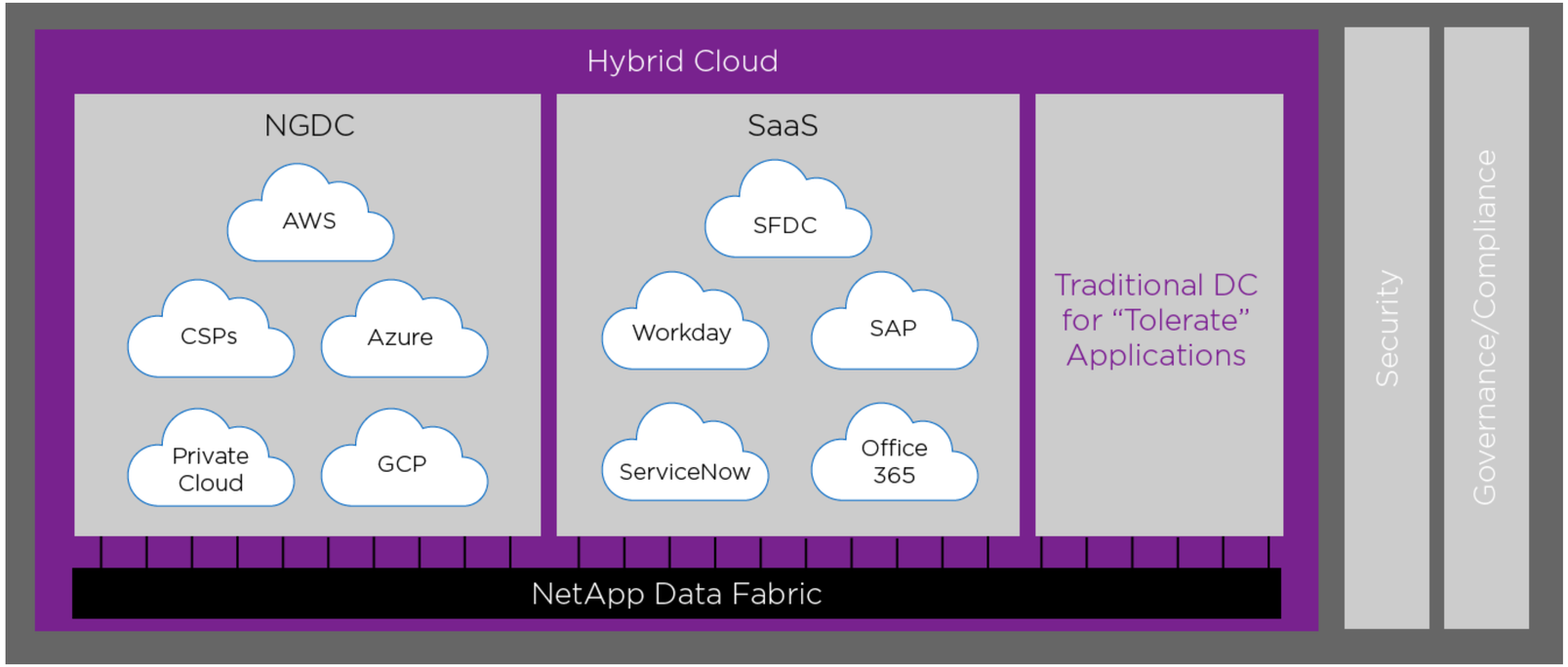
MIKE MORRIS
Senior Director, IT Cloud Services, Strategy, and Innovation

Our future uncentered data center at NetApp

When the NetApp IT team was challenged by CIO Bill Miller to build a future, next generation vision of our data centers using NetApp technologies, the team found no clear, practical definition existed of Next Generation Data Center (NGDC). Yet, they were certain of one thing: no longer is there a center of data. Data is no longer centralized in a brick and mortar data center. It has become uncentered and resides with SaaS providers, hyperscalers, private clouds, and co-location facilities.

As part of internal debates and discussions, the team decided a proper NGDC definition must start with an evaluation of NetApp's enterprise application portfolio to determine best target end-state infrastructure. Applying Gartner's TIME (tolerate-invest-migrate-eliminate) model to assess our enterprise application portfolio, it was determined:

- 27% of the application had a tolerate status, i.e. no incremental investment and keep running until no longer needed;
- 36% of the applications are "invest-strategic" and require investment to deploy new capabilities and/or enhance current functionality;



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- 32% of the application have functionality that must migrate to a different application or platform; and
- 5% of the applications will be eliminated to free up resources and reduce costs

It was this evaluation that led the team to develop a definition of NGDC, especially when looking at the applications that fell into the "invest-strategic" and "migrate" categories.

Over the next three to five years, NetApp IT's enterprise architecture team sees 70% of the "invest-strategic" and "migrate" apps migrating to software-as-a-service (SaaS). Considering that NetApp IT is a relatively typical enterprise IT shop, we want to take advantage of the common business processes which are automated and packaged by SaaS providers, forming 70% of our future enterprise application portfolio.

The remaining 30% of applications are unique to NetApp, providing a competitive advantage which cannot be rented from a SaaS provider. These applications will need a software controlled and orchestrated development platform that allows developers to build and run cloud-aware applications using advanced methodologies like DevOps and CI/CD delivery models. This is NGDC. These apps will run in our NGDC which consists of cloud service providers, including AWS, Azure, Google Cloud, and even our private cloud using NetApp technologies like SolidFire and Hyper Converged Infrastructure (HCI).

The next generation data center is one part of our complete hybrid cloud portfolio, which also includes SaaS providers and a dramatically downsized traditional data center to house the aforementioned "tolerate" applications. The NetApp Data Fabric provides a competitive advantage by tying these different ecosystems together and providing the right mechanisms to share data between the three environments.

At this point; the proper hybrid cloud is complete, allowing IT to bring the traditional enterprise IT business process to bear, but in a much more flexible, agile and efficient way. We can then do things more rapidly, more automated, and more flexible because we have a better technology ecosystem on which to run all applications. ■

Data is **no longer centralized** in a brick and mortar data center.

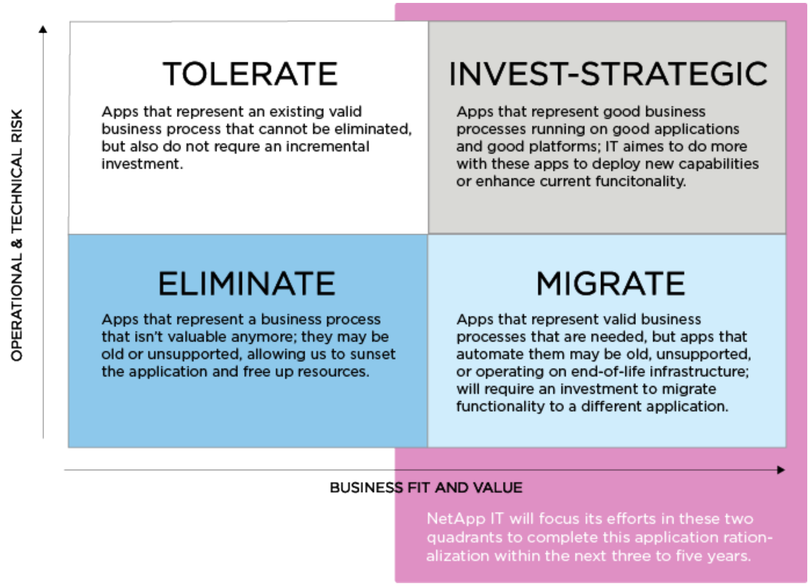
Determining What Enterprise Apps Go Cloud

RAJESH SHRIYAN
Director of IT Enterprise Archtecture

NetApp has been in business for over 25 years, long before the Internet became popular and cloud-aware application architecture came into existence. Many of our enterprise applications at NetApp are customized from their original form with spaghetti-like integration points and add-ons. These complex, heavily customized apps complicate business processes, increase operational costs, magnify security exposures, and reduce our IT agility. We must simplify our enterprise application portfolio by consolidating onto major platforms and maintaining a deliberate hybrid cloud evolution to decide what goes cloud and what stays home.

As a first step to simplify our enterprise business application portfolio, we identified all apps that are potentially cloud eligible. We filtered out any IT (homegrown) monitoring tool and any R&D app managed by our sister Engineering team at NetApp. It is also not necessary to analyze our major applications or core platforms that have existing cloud roadmaps like HR and CRM/Field Sales. The next step assessed each in-scope application for business value and technology risk/effectiveness based on Gartner's TIME model: Tolerate, Invest, Migrate and Eliminate.

- "Tolerate" applications represent an existing valid business process within NetApp that cannot be eliminated, but also does not require an incremental investment. These applications will be tolerated; they will continue to run, and IT will continue to maintain them. Approximately 27% of our enterprise apps were categorized as Tolerate.
- "Eliminate" applications represent a business process that isn't valuable to NetApp anymore. They may be old and/or unsupported, allowing us to sunset the application and free up resources. Eliminating applications is easier said than done, as business leaders still using the apps must be consulted first. Less than 5% were identified as Eliminate.
- "Migrate" applications represent valid business processes that are needed at NetApp, but the apps that automate them may be old, unsupported, or operating on end-of-life infrastructure. These applications require an investment to migrate functionality to a different application. About 32% of our applications have functionality that can be migrated to another app.



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We are not just **forklifting** our applications from our traditional data center into a cloud.

- "Invest-strategic" applications represent good business processes running on good applications and good platforms. The IT team aims to do more with apps that fall into this category to deploy new capabilities or enhance current functionality. Roughly 36% fell into this category.

Our TIME evaluation, performed in conjunction with the business, led the team to define how to evolve our hybrid cloud and set a vision for our Next Generation Data Center (NGDC). This is especially true when looking at those applications that fall into the "invest" (strategic) and "migrate" categories. In the two right quadrants, 70% of the applications will move to software-as-a-service (SaaS) providers as we recognize it's best to rent commodity software for things like email, collaboration, ERP, and CRM.

The other 30% of our enterprise apps are going to the NGDC which involves cloud providers like AWS, Azure, Google Cloud Platform, and private cloud. These apps must be cloud aware, i.e. stateless, dynamic, microservices-based, and created using DevOps and CI/CD delivery models in a software-controlled and orchestrated hybrid cloud ecosystem.

By completing this 4-quadrant application rationalization, we can now evolve our hybrid cloud and continue with our cloud first strategy. It validates that SaaS is the right solution for commodity services like payroll and benefits, and perhaps even for some systems of record apps like finance and revenue recognition. NGDC will come into play for those applications that differentiate and give NetApp a competitive advantage while our traditional, brick-and-mortar data centers will host the tolerate applications.

At NetApp we are not just fork-lifting our business enterprise applications from our traditional data center into a cloud. We are taking the time to do an application rationalization, to build a proper supporting ecosystem, and to ensure our apps are deployed to the appropriate environment. ■

Capturing the Economic Benefits of Cloud with Cloud-Aware Application Architecture

ROBERT STUMPF
Sr. Director, IT Business Applications

As NetApp transforms its current hybrid cloud into the next generation data center (NGDC), NetApp IT has prioritized building a development platform for cloud aware applications using cloud aware application architectures through DevOps and automated deployment cycles.

The team has set a target via application rationalization for the next 3-5 years, that 70% of its apps will be Software as a Service (SaaS), like SAP HCM, Cisco WebEx, and MS Office365 and Sharepoint. The remaining 30% comprises apps not available from SaaS providers. For these apps, IT will use DevOps methodologies and cloud-aware referenced architectures to convert its remaining enterprise applications to use hyperscalers and private cloud, or its NGDC.

There are many things impacting applications in IT organizations, including cloud, containers, microservices, DevOps and more. For our cloud-first strategy to run optimally, we need to change the way we create applications in IT to ensure that NetApp captures to the economic benefits of cloud.

Why create applications differently?

Hypothetically, NetApp IT could take the existing enterprise architected applications and forklift them up to Amazon, where it's certain that they will run. Yet you must recognize that these applications were built to run in an enterprise class data center on capital intensive hardware that's depreciated over three years and intended to run constantly forever. They are not designed to take advantage of the capabilities of a cloud.

In this situation there is no resource awareness or dynamism. By taking existing app architectures and development models and "forklifting" them into a cloud, a lot of money is spent with the cloud provider, which then becomes the one to capture the economic benefits of the cloud—not NetApp IT.

If we change the way we build applications and move to a cloud-aware application architecture, we ensure that IT captures the economic benefits of the cloud.

App Architecture Factor	Cloud Aware App	Enterprise App
Design Model	Standardized microservices architecture with APIs Highly portable with infrastructure abstraction	Customized, stateful, monolithic services with middleware integration
Development	Agile with DevOps, faster time to market	Waterfall with release windows, slower deployments
Delivery	Continuous delivery with standardized blueprints and automated workflows	Planned monthly/quarterly release windows with manual touch-points
Resiliency and Scalability	Infrastructure agnostic with intelligence at application layer; cost, resource and failure aware with elastic scaling and recovery	Infrastructure dependent with dedicated hardware for resiliency, scaled to max capacity with high cost
Change Management	Smaller and frequent incremental changes, lower change risk and minimal downtime	Long planned release cycles and downtime with dependency on vendor custom code
Storage Medium	Heavy object storage usage with NoSQL DBs	Traditional volumes and LUNs with files and RDBMS

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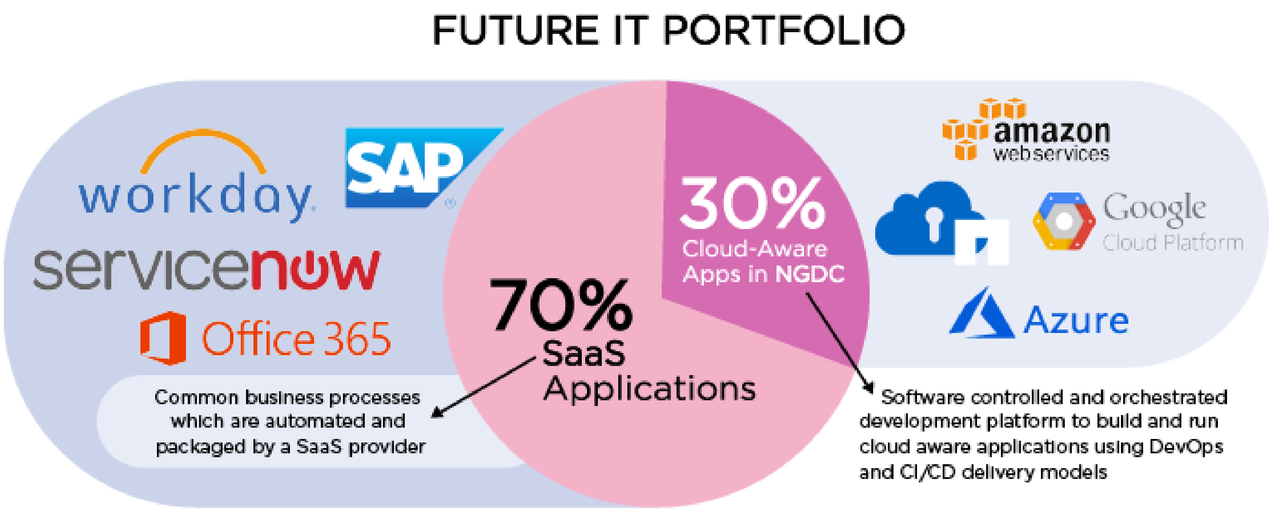

The potential benefits of cloud aware applications include:

- Ability to dynamically scale applications on demand and not have assets installed at max load—even better with microservices
- Shorter development cycles because of increased release velocity, greater developer flexibility, and reduced risk with smaller changes
- Better fault isolation with independent microservices
- Ability to deploy and decommission application environments on demand, e.g. no need for multiple development, test or stage environments
- Portability with containers that provide ability to code and deploy applications anywhere and eliminate vendor lock-in

The Role of NetApp Technology

To accelerate our journey to building a cloud aware enterprise, we rely on three important NetApp products: NetApp Cloud Volumes for data storage in the hyperscalers, NetApp Hyper Converged Infrastructure (HCI) for containerized applications with combined storage, networking and virtualization compute, and AFF All Flash Arrays for demanding workloads, data analytics, and databases. Looking to the future, our CIO Bill Miller envisions business process automation through machine learning, federated cloud, bots and more. NGDC and cloud-aware application architecture will serve as a catalyst to accomplish this goal.

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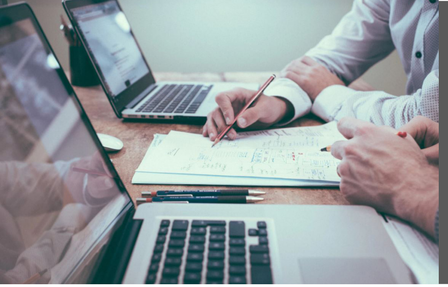

Authors

Matt Brown
Matt leads the NetApp on NetApp program, where NetApp IT subject matter experts share their experiences and best practices in managing a global IT organization with employees, customers, and partners. These experts discuss how IT deploys and supports NetApp technologies and services to meet the business needs of a global enterprise.

With nearly 30 years of leading a variety of IT functions, Matt has firsthand experience with many of the top challenges of modern IT, like IT service transformation, automation, cloud adoption, digital transformation and managing IT in a global, hybrid cloud world. As a member of the CIO staff, Matt talks with customers and partners about how NetApp IT is enabling business growth, enhancing customer support, building faster go-to-market capability, advancing cloud aware business applications, and improving operational efficiency.

Michael Morris
Michael Morris is the Senior Director of IT Infrastructure at NetApp. Mike leads NetApp IT's initiative to identify and evaluate next generation and emerging technologies that support our NetApp product strategy, empowers IT data management, and harnesses the power of the hybrid cloud. Mike's team manages the IT tools, software platforms and methodologies to deliver DevOps, CI/CD, automation, and service management to exploit the benefits of cloud today and tomorrow.

Robert Stumpf
As Senior Director of IT Business Applications, Robert Stumpf is responsible for all corporate business applications development and the delivery of IT projects for these apps. Robert and team bring cloud-ready solutions to NetApp's corporate business applications and play a vital role in our IT transformation. Together they manage large enterprise projects with a focus on deploying new business functionality quickly while minimizing operational risk.

Rajesh Shriyan
Rajesh Shriyan is the Director of IT Enterprise Architecture at NetApp. Rajesh and his team work with NetApp's business teams to ensure application capability in the enterprise and map applications to these capabilities. They help determine how an organization can most effectively achieve its current and future objectives.W

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