



# **Technical White Paper: Cloud Versus On Premises**

# Abstract

All of our customers have the same desire: to succeed with Apple. But each measure of success is as unique as the organization itself, and as businesses grow and change it's a good idea to reassess how your tools are working for your organization.

Depending on scale, business goals and long-term planning, your organization may have better success hosting Jamf Pro in Jamf Cloud — even if you've been happy so far with Jamf Pro on-premises.

This paper makes clear the total cost of ownership and benefits for our cloud hosting option, allowing you to choose your best path to success.

# Table of Contents

## **4 Availability**

4 Facilities

## **5 Backup & Recovery**

5 Service & Support

## **7 Monitoring & Alerting**

## **8 Staffing**

## **9 Time to Market**

9 Innovation

## **10 Optimization Expertise**

## **11 Security**

## **12 Compliance**

## **13 Platform**

# Availability

The cloud is better suited to rapid, agile response, and Jamf Cloud has high availability — by default.

Every production infrastructure instance we create is built with an N+1 configuration parallel redundancy. This is a safeguard to ensure uninterrupted access, and applies across all infrastructure. When you compare on-premises hosting to Jamf Cloud, you should factor in the multiple data centers and parallel infrastructure the cloud offers you for these layers:

- Firewalls
- DNS servers
- Load balancers
- Apache servers
- Application servers (Tomcat)
- Database servers (MySQL)
- Caching servers (Memcached)
- Storage servers
  - Distribution point
  - Backup server infrastructure
- Content delivery network
- Network and data transfer
  - Internal and external network design
- Infrastructure as code rather than physical hardware or configuration tools, which delivers far more flexibility

# Facilities

- Site selection
  - We make environmental and geographic assessments to mitigate environmental risks such as flooding, extreme weather and seismic activity.
  - The N+1 architecture also provides further protection from these risk.
- Datacenters
  - Jamf Cloud customers never worry about redundancy for environmental controls, power grids, UPS battery backup equipment, fire suppression, leak detection, etc.
- Physical security
  - Also gone: any worry about physical security of server infrastructure. The location of the data center is not shared, authorized personnel guard the facilities, Closed Circuit

Television Cameras (CCTV) are used, staff are required to get past guards with multifactor authentication and alarms are in place to catch attempted violations.

- Media destruction
  - All media related to customer data is classified as critical. Decommissioning follows NIST 800-88 standards.
- Capacity planning
  - Jamf has currently selected Amazon Web Services (AWS): the largest cloud provider that invests billions in property, plant and equipment. Amazon has a proven physical capacity track record for global infrastructure capacity.
- Instance provisioning
  - Jamf ensures that we have adequate capacity to launch new instances and to scale existing instances. We have monitoring established for AWS limits and a dedicated team at Amazon ensuring that we will always be able to provision capacity.

## Backup and Recovery

- Nightly backups
- 30-day data retention
- Separation of duties
  - Example: We have a distinct backup account with limited read and write access to reduce the blast radius if a malicious actor deletes data.
- Automated backups prior to any changes, such as upgrades
  - Internal control over changes and ability to review processes for any manual processes on customer infrastructure
- Reserved infrastructure
  - Jamf Cloud reserves the capacity for your instances to work with AWS. This means that you can have a higher level of assurance that your instances will be online even in the unlikely event of AWS capacity constraints.

## Service and Support

At Jamf, we take pride in our level of customer obsession. This differentiates us from most other companies: we have a 96% customer retention rate and average 4.6 out of 5 for customer satisfaction scoring. Our 45 NPS (Net Promoter Score) shows that our customers love to recommend us to their peers, and after substantial investments in Jamf Cloud, we've even managed to beat ourselves at our own game: Jamf Cloud customers statistically refer peers to

Jamf more than even our already high referral rate from on-premises customers. Part of what makes for this enthusiasm: our global teams can work across time zones and across teams in Jamf to ensure you receive faster troubleshooting due to our global coverage and short feedback loops between our engineers.

### **Global 24x7x365 Cloud Operations team**

- Minneapolis, MN
- Eau Claire, WI
- Amsterdam, The Netherlands
- Katowice, Poland
- Sydney, Australia

### **Enterprise Support with our Cloud Provider – minimum pricing of \$15,000/month if you self-host with the same provider**

- 24x7 and direct access to a Sr. Cloud Engineer
- Dedicated Solutions Architect
- Technical Account Manager
- Account team dedicated to our billion-dollar portfolio (Vista companies only)

### **Regional Jamf Account teams**

- Jamf has a global account team that advocates for you. They engage directly with Jamf Cloud developers to ensure they represent your needs.
  - Minneapolis, MN
  - Eau Claire, WI
  - Austin, TX
  - Cupertino, CA
  - New York, NY
  - Amsterdam, The Netherlands
  - Emmen, The Netherlands
  - Causeway Bay, Hong Kong
  - Katowice, Poland
  - London, United Kingdom
  - Munich, Germany
  - Stockholm, Sweden
  - Sydney, Australia
  - Tokyo, Japan

# Monitoring and Alerting

- Service Level Agreement (SLA)
  - Jamf Hosting Terms and Conditions contractually guarantees customers 99.9% system availability. Jamf will provide credits if we ever fail to deliver on this guarantee equal to the terms of that agreement.
  - As of 11/29/2019 that amounted to the following figures:
    - 99.0% to 99.9% - 3 days of service added
    - 95.0% to 98.9% - 7 days of service added
    - 94.9% or below - 15 days of service added
- Monitoring
  - Jamf spends many hundreds of thousands of dollars per year on monitoring to ensure that we are providing our customers with the best service possible. This includes coverage for the following areas:
    - Application Performance monitoring
      - Ensuring application performance is delivering within defined baselines. If there is a problem, Jamf Cloud and Jamf Engineering teams can view specific transactions that may be causing degradation.
    - Server monitoring
      - Monitors our cloud servers to ensure we're proactively sizing our servers appropriately from a CPU, memory, network and disk perspective.
    - JMX monitoring
      - You'll no longer need open-source monitoring tools like Zabbix, Jconsole or Nagios. Jamf Cloud automatically collects the JMX metrics we find most valuable.
      - More information found here: <https://www.jamf.com/jamf-nation/articles/527/java-management-extensions-jmx-glossary-for-jamf-pro>
    - Service monitoring
      - This includes monitoring the Jamf Pro health page to ensure every Jamf Cloud customer has a healthy instance that is online and ready to use:  
[https://docs.jamf.com/10.3.0/jamf-pro/administrator-guide/Jamf\\_Pro\\_Health\\_Check\\_Page.html](https://docs.jamf.com/10.3.0/jamf-pro/administrator-guide/Jamf_Pro_Health_Check_Page.html)
    - End-user monitoring
      - Tracks actual end-user response times from their browser so that we can capture slow performance and errors. This gives us the metrics to determine the response-time health of Jamf Pro sessions.
    - Incident communication tooling
      - We provide our customers a **status page** with an overview of the health of Jamf Cloud environments across our product line.
    - Incident management and alerts
      - Our global teams are paged when issues arise. They triage incidents, maintain on-call schedules and receive notification when alerts have been addressed.

- Enterprise logging
  - Logging is critical to ensure you have full insights into your environment and can troubleshoot when issues come up. We provide a scalable platform that can meet the needs of the data that you produce, when you produce it.
- Custom monitoring
  - Jamf provides a great deal of custom monitoring and alerting. This includes monitoring external dependencies such as APNs and certificate expiration monitoring. This can prevent critical failures that may lead to an inability to manage devices, or even having to re-enroll devices.
- Java optimization tooling
  - Jamf offers auto-detection of JVM issues and intelligent recommendations for optimizing performance at this level.
- AWS configuration monitoring and enforcement
  - We have pre-built many policies to ensure that our environment has been hardened through tools such as AWS Config and through the use of Service Control Policies.

## Staffing

- Training for networking, server management, Java and all tiers as mentioned above in the availability section
- Infrastructure as code
  - Jamf Cloud environments are automated from the time of deployment. To manage a comparable environment, an organization would have to require an infrastructure as code mentality with related CI/CD tooling.
- Hiring challenges
  - In a full labor market, server administrators to manage these environments can be difficult to recruit and retain.
  - Increasing upfront costs for these additional areas may mean less funding to focus on building an Apple Center of Excellence and hiring the Mac administrators and iOS administrators that can help your organization succeed.
- Lifecycle management
  - Proper management of Jamf Pro should involve building processes for promoting changes from one environment to another after testing and validating the change. If staff is focused on the other areas of need in this document, they will have less time to focus on this critical area.

# Time to Market

- Implementation
  - Jamf provides a product implementation (JumpStart) to new customers to help them get onboarded, which cuts start-up in half. This helps you get up and running more quickly, and if you opt for an extended JumpStart, this frees up more time for you to focus on other business operations.
- Release candidate program
  - Early evaluation of the latest Jamf Pro features before all other customers. In Jamf Cloud, we manage these upgrades for you.
- Jamf Pro maintenance
  - Jamf Cloud and Jamf Cloud Premium customers keep more current than on-premises customers.
- One example: One year after launching version 10 of Jamf Pro, we saw 99.7% adoption across Jamf Cloud. On-prem customers were 10%+ behind for version 10 adoption.
- This is significant as new versions include security improvements, bug fixes and new capabilities.
- Migration services
  - Jamf has a team focused on performing migrations along with an automated pipeline to ensure that all relevant configuration settings get updated if you choose to migrate to Jamf Cloud.

# Innovation

- Jamf Cloud is the first environment to receive new Jamf Pro builds.
- Many of our teams are now developing with native AWS services such as SQS, SNS, API GW and DynamoDB. As we continue to optimize our architecture for those platforms, you receive the benefits. Our self-hosting option may have most functionality but may not be as optimized as our hosted cloud offering.
  - Today there are Jamf Cloud-only capabilities: for example, we include Jamf Cloud Distribution Service (JCDS) so you can easily upload your packages and distribute them through a global CDN (Content Delivery Network).
- Maturation of Jamf Cloud optimizations
  - Optimization based off number of devices, performance metrics and SLA data
  - Continued evaluation for number of policies, configuration profiles, recurring check ins, number of actions, extension attribute usage, number of smart groups, smart group nesting, etc.

# Optimization Expertise

Our engineers love to immerse themselves into technology, and our Jamf Cloud environment benefits from it. We don't just worry about what version of Java or Tomcat to run; our teams go much deeper to understand the intricate details of how to best optimize the Jamf Cloud as a whole. Our teams live and breathe these areas daily: producing thousands of pages of guidance. When you operate in Jamf Cloud, your deployment benefits from these years of experience. You can trust your engineers to be Jamf Pro certified and trust that the engineers are involved in creating the course material.

- Scaling
  - Internally-built automated performance testing tool
  - Managed scaling vertically and horizontally for Jamf Pro instances in Jamf Cloud
- Tuning
  - AWS
    - Dynamic instance-sizing based off workload
    - Monitoring of usage and proactive engagement when unusual activity is observed
    - Countless low-level optimizations (ex. analysis on EBS sizing for proper IOPS)
  - Java
    - JVM heap optimization
    - Garbage collection
      - Serial collector
      - Throughput (parallel collector)
      - Concurrent Mark-Sweep (CMS) collector
      - Garbage first collector
      - G1 GC log analysis
    - Threading
  - Databases
    - MySQL tuning
      - Managed migrations from MyISAM databases
      - InnoDB optimizations and buffer pool management
      - Caching
      - Max connections
    - Health
      - Storage space management
      - mysqlcheck

- Logging
  - Centralized logging
  - Auditing and retention
  - Log rotation and space management
- Troubleshooting
  - Thread dump analysis
  - Core dump analysis

## Security

Information security is our number one job; our work in this area is extensive. We can take the work off your plate by ensuring our environments have controls in place for areas such as:

- Vulnerability management
  - Vulnerability scanning and assessment
  - Malware scanning and assessment
  - External port scanning and assessment
  - Web application scanning and assessment
- Security event management
  - Log collection
  - Security event monitoring
  - SIEM tool support
  - Big data management
  - Anomaly monitoring
- Security configuration monitoring
  - Server configuration monitoring
  - Firewall monitoring
  - File integrity monitoring
- Security review and audit
  - Internal security audit
  - SOC2 control ownership
  - Risk assessment
  - Security baseline management
- Identity and access management
  - Access review
  - Key management
  - User access control

- Security incident management
  - Alert analysis
  - Security incident response and forensics
  - Incident post-mortem analysis
- Security testing
  - Disaster recovery testing
  - Penetration testing
  - Monitoring controls testing
  - Internal code review and testing
- Patch management
  - Patch assessment
  - Patch planning
  - Patch deployment
- Secret-keeping
  - Secure credential storage
  - Protected administration credentials and rotation processes

Each of these controls can be extensive, and each business has different needs. A brief total cost of ownership document can't thoroughly describe the processes, controls and costs for each area, so we suggest you investigate further.

Regardless of where you host Jamf Pro, we encourage you to focus on areas such as those outlined above to ensure the security of the devices Jamf Pro manages. When security issues like Meltdown or Spectre arise, what is the cost to your organization to take quick action?

## Compliance

We hold ourselves to high standards when we host Jamf Pro for you. This spans across the way we manage the environment, the external parties we pay to audit our processes and the assurance of the security of your Jamf Pro instances. Self-hosting Jamf Pro and establishing the same level of compliance would be a significant and costly undertaking.

- Service Organization Control 2 (SOC2) report
  - Jamf worked with PricewaterhouseCoopers LLP to perform an audit of our controls as they relate to security, availability and confidentiality. You may request this report from your sales team. This is a significant six-digit cost if you were to hire auditors in your environment to audit controls around Jamf Pro, but it's a part of our everyday.

- ISO27001
  - Jamf successfully completed a third-party audit for ISO 27001. The certification is valid May 4, 2020 through May 4, 2023.  
More information is available at <https://www.jamf.com/security/>
- In order to help customers achieve the highest levels of security, Jamf Pro can be hosted in AWS GovCloud which is a FedRAMP High and Moderate environment.
- Penetration testing
  - Jamf closely partners with the third-party Pen Testing Group to perform annual pen testing of our Jamf Cloud environment. This ensures we are delivering the most secure service offering possible.
  - External assessments of this variety often exceed six digits for each engagement.
- AWS
  - Data center risk management
    - We document third-party security attestation and use it to obtain security certifications. External auditors test physical controls such as media disposal, reviewing security camera footage, observing entrances and hallways, testing control devices and examining data center equipment.
  - Well-architected assessments
    - AWS provides an independent audit by a certified solutions architect and grades us on the following categories:
      - Security
      - Reliability
      - Performance
      - Cost optimization
      - Operations

## Platform

- Tiers of support: platform and product optimization
  - Jamf Cloud works directly with our software engineering teams to drive what versions of software Jamf Pro supports. This includes currently supported technologies for Jamf Pro, and we're also driving cloud optimized configurations for Jamf Cloud. This extends beyond common core requirements like Java, MySQL and Tomcat. It includes driving and standardizing technologies like elastic load balancers, application load balancers, Amazon Linux and Amazon Aurora. Jamf Cloud customers benefit from this close relationship as their Jamf Pro configurations are optimized not just at a configuration level, but also for the platform itself.
- Best practices
  - Adoption of Jamf Cloud helps us drive best practices within a company.

- Example 1: We require data access to go through the API (Application Program Interface) vs. direct database access. This helps ensure that organizations use supported paths to perform custom scripting, automation and integrations with Jamf Pro. Failure to follow that best practice can result in broken integration work as new versions of Jamf Pro ship.
  - Example 2: We only accept HTTPS traffic and never listen on HTTP to prevent accidental posts of sensitive data in our Jamf Cloud environment.
  - Example 3: Cipher policies on load balancers disable TLS v1.0 to ensure your environment remains secure from day one.
  - Example 4. Security group best practices limit access to database infrastructure from the application server tier.
- Jamf Marketplace
    - Our Marketplace is becoming more integrated with Jamf Pro. Our partners are building for Jamf Cloud workloads, and we envision that our integrations for Jamf Cloud customers will be easier to evaluate and implement.
  - Jamf Cloud vs. Direct AWS use
    - Customers can self-host on Amazon Web Services and realize some of the benefits that Jamf Cloud leverages. However, doing so comes with hidden costs covered in this document and misses out on items such as:
      - All automation for deployments, upgrades, backups and cross-region working smoothly
      - Added knowledge and maintenance related to designing, deploying and maintaining not just the infrastructure but areas such as AWS VPC's, IAM permissions, S3 buckets, VPN infrastructure, etc.
      - Economies of scale efficiencies: We host thousands of customers and millions of devices and can optimize more efficiently as a result.
  - Non-production instances
    - Internally, Jamf has created a cloud-based deployment mechanism for launching Jamf Pro instances using Kubernetes. This platform typically launches 10,000 – 15,000 Jamf Pro instances for the purposes of testing the application each month.

If you aren't yet a customer of Jamf, or if you're a happy on-prem customer, you still might find it worth your while to investigate our Jamf Cloud offering for a more agile, responsive, and worry-free management experience.

**Contact us and start to see the benefits of Jamf Cloud for yourself.**