



CONNECT ARCHITECTURE OVERVIEW

Engineering, Security, and
Operations

January 2023



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Architecture

The Mastery Connect cloud architecture is built on Amazon Web Services infrastructure and provides unmatched availability, scalability, and reliability. The Instructure solutions' architecture and the AWS infrastructure are fully horizontally scalable, providing virtually limitless capacity via the provisioning of additional resources. This allows Mastery Connect to provide automated provisioning under heavy load, data redundancy and fail-over across geographies, and hands-free updates that rarely require downtime.

The Infrastructure architecture and the AWS cloud infrastructure provide:

- Redundancy of computing resources with active monitoring for failure detection and automated fail-over
- Real-time performance tuning via Automated Provisioning of resources to respond to spikes and peak usage times to minimize performance degradation
- Data protection with real-time cross-availability zone replication of data and database
- Load balanced application servers and aggressive data caching for superior web performance
- Rolling release schedule of upgrades and updates, rarely incurring system downtime

A hosted solution means you will not need to worry about:

- Buying, setting up, and maintaining server hardware or software
- Devoting valuable IT resources to the implementation of Instructure solutions
- Ensuring constant security
- Backing up data
- Applying updates and patches

Hosting Regions

Mastery Connect is primarily hosted in the AWS US-East-1 region located in Virginia. Within this region, Mastery Connect takes advantage of 3 different availability zones.

Security Program

Mastery Connect is included as part of Instructure's robust information security program that runs on a continuous, PDCA-cycle. It was created based on guidance provided by ISO/IEC 27000:2018 and controls described in ISO/IEC 27001:2013, and is managed by Instructure's Chief Information Security Officer. The security program is attested to by a number of current security certifications including ISO 27001, SOC 2, SOC 3, and UK Cyber Essentials Plus.

Mastery Connect has a software development lifecycle (SDLC) that incorporates secure coding practices and controls. All code goes through a developer peer-review process before it is merged into the code base repository. The code review includes security auditing based on the Open Web Application Security Project (OWASP) secure coding and code review documents (including the OWASP Top Ten) and other community sources on best security practices.

Instructure's Security Team regularly performs vulnerability scans on Mastery Connect using a number of internal and external tools and techniques and we publicly publish the results of our annual third-party penetration tests because we believe that being open about all things - security included - enables us to build the best possible product for our customers. The most recent report can be found at <https://www.instructure.com/security>.

In addition to these measures, the Amazon Web Services infrastructure on which Mastery



Connect is hosted has a variety of formal accreditations. Some of the many certifications include:

DoD SRG • FedRAMP • FIPS • IRAP • ISO 9001 • ISO 27001 • ISO 27017 • ISO 27018 • MLPS Level 3 • MTCS • PCI DSS Level 1 • SEC Rule 17-a-4(f) • SOC 1 • SOC 2 • SOC 3 • UK Cyber Essentials Plus

For additional information about AWS security certifications and standards compliance, please refer to <http://aws.amazon.com/security> and <http://aws.amazon.com/compliance/>.

Product Security

The following is an overview of Mastery Connect's product security measures:

- All data is encrypted in transit with TLS v1.2 or v1.3
- All data is encrypted in storage (at rest) using the AES-256-GCM algorithm.
- The Mastery Connect API is secured by OAuth.
- The Mastery Connect VPC (Virtual Private Cloud) securely resides within the AWS network, which is separate from the public internet. Within our VPC we also have separate public, private and protected subnets.
- A level 7 Web Application Firewall monitors for malicious requests and further protects the application from potential exploits by filtering traffic before it even reaches the platform.
- Host-based vulnerability scans are performed at least quarterly on all external-facing systems. Critical and high vulnerabilities are tracked to remediation.
- Minimal PII is captured, and Instructure maintains a Data Protection Policy reviewed annually.

- Instructure is compliant with the EU's national data privacy and protection law, the General Data Protection Regulation ("GDPR").

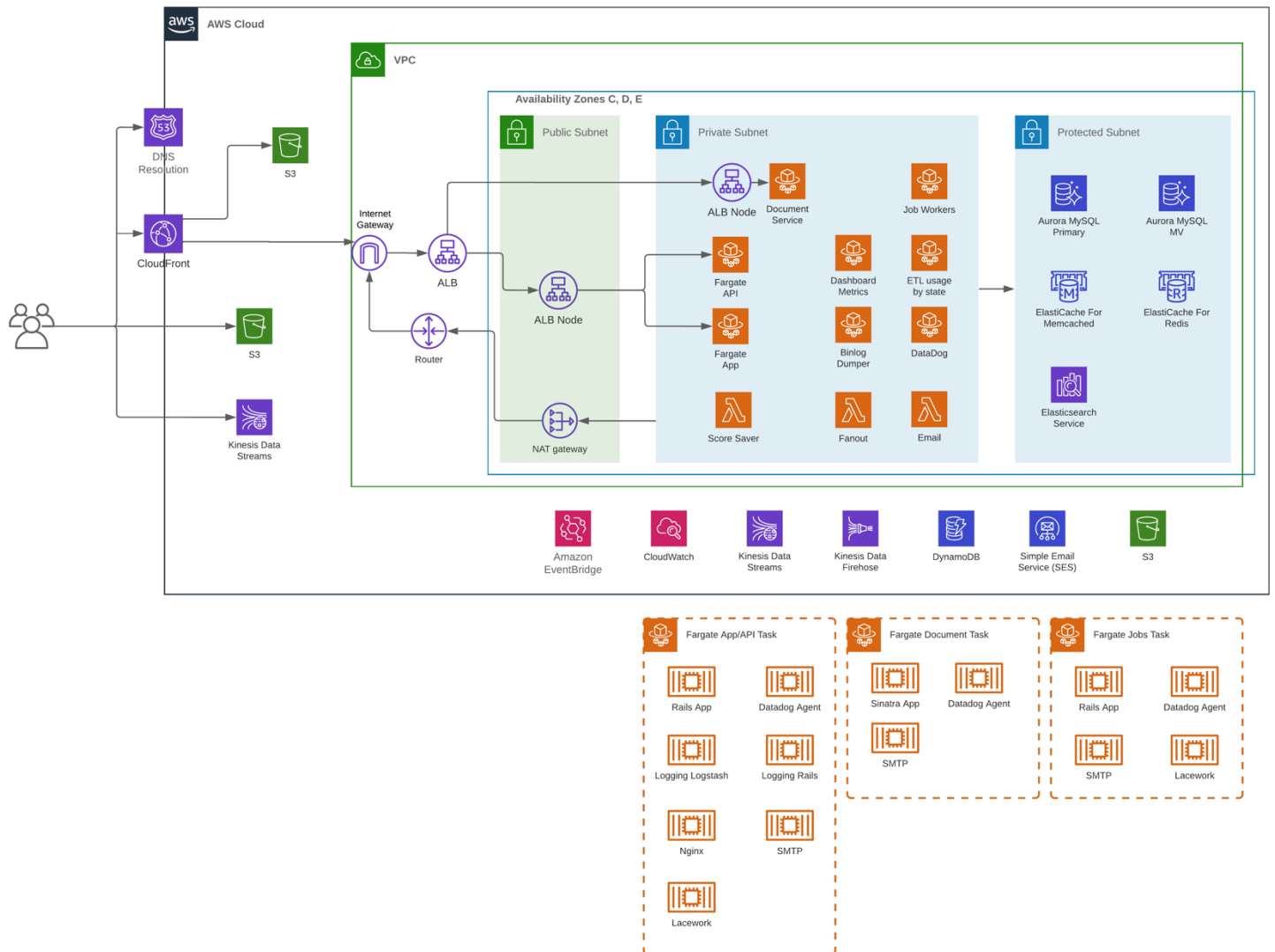
Tech Stack / Languages

Mastery Connect is made up of several components, with some variation of programming language:

- The Mastery Connect backend application is Ruby on Rails
- The Mastery Connect frontend is the Instructure UI which is built on top of React



Architecture and Data Flow Diagram



API

The Mastery Connect API allows schools and districts to integrate with Mastery Connect using API calls. School and district administrators can use the Mastery Connect API to manage teachers, students, sections, standards, and assessments. The available API calls can "post" data to Mastery Connect from an outside source, or they can "get" data from Mastery Connect to use in other applications for reporting, third-party analytics, etc.

The Mastery Connect API documentation can be found at inst.bid/mastery/connect/api

Learning Tools Interoperability (LTI)

Mastery Connect is connected to your LMS and via LTI and the LTI integration between your LMS and Mastery Connect is rather simple.

If using Canvas LMS, your Mastery Connect admins can generate the necessary Key, Secret, and URL from the Admin menu of your Mastery Connect instance and enter this data into the Apps area of your Admin console.

Once configured, Canvas users will have a "Mastery" icon along the Global Navigation bar providing a seamless experience for students who can now take Mastery Connect assessments within Canvas. Additionally, teachers can now create Mastery Trackers from within a Canvas course or link existing trackers to a Canvas course.

Third-Party Integrations

Mastery Connect is designed to integrate with the institution's Student Information System. We have experience working with most SIS platforms in K12 and have a variety of methods to automatically sync rosters and enrollments, including using Clever. We integrate with most learning management systems (LMS) to streamline user experience for both teachers and student using the 1EdTech LTI standard (formerly known as IMS Global). We also support numerous methods of single-sign-on and have worked with districts all over the country in various SSO implementations.

Backup & Restore

Mastery Connect conducts asynchronous near real-time replications which are stored within a remote site located in the AWS S3 Cloud. Additionally, nightly backups of every database are performed and stored in a third remote site within AWS.

Backups are performed using a combination of Aurora Backups (for PIT and incremental snapshots) and AWS Backup (for monthly and yearly backups).

Backups are retained based on the following schedule:

- Point in Time Snapshots: 35 days
- Daily Snapshots: 35 days
- Monthly Backups: 12 months
- Yearly Backups: 10 years



Compliance

ISO compliance

Instructure has invested in a robust quality management and security program that's founded on the guidance provided by the International organization for Standardization's (ISO) 27000 suite of standards and we hold ISO 27001:2013 certification, of which, Mastery Connect is included in scope.

SOC 2

Mastery Connect has been audited in accordance with SSAE 18, and a SOC 2 Type II report is available for review upon execution of a non-disclosure agreement. A copy of the SOC 3 report is provided in the Mastery Connect Security Package, available at inst.bid/mastery/connect/dl.

FERPA & COPPA

Mastery Connect is compliant with both the Family Educational and Privacy Act (FERPA) and the Children's Online Privacy Protection Rule (COPPA)

Accessibility

Instructure is committed to delivering products that are accessible and inclusive. We target WCAG 2.1 AA standards in our development. The Mastery Connect team is actively making accessibility improvements. We will continue to make and release additional accessibility improvements as part of our Agile development processes, and anticipate providing a formal VPAT for Mastery Connect in the future.

Personally Identifiable Information (PII)

Personally Identifiable Information (PII) in Mastery Connect is minimal and only collected to ensure an optimal user experience. We collect Personal Data from Teachers and Parents when a Teacher or Parent accesses and takes actions on our Site, Apps or Services, such as when a Teacher or Parent creates an Account. We also collect Personal Data from Teachers when a Teacher creates and posts content to his or her Profile and/or Newsfeed and interacts with other users, including with Students.

We also collect Personal Data about Students that is provided to us by Teachers or Schools, such as their names, student assessment responses and other evidence of learning. If a Teacher creates an Account on behalf of the Student, we collect limited Personal Data about the Student from the Teacher to establish the Account.

Users only have access to the dashboards that their permissions allow, thereby prohibiting users from being able to access PII that they do not have permission to view. Furthermore, it is our policy to not create or retain physical records of personally identifiable information (PII) or confidential client data.

Conclusion

As with all of our products, Mastery Connect is developed and delivered using a robust information security program that runs on a continuous, PDCA-cycle. For more information, including access to the Mastery Connect SOC 2 report, please contact your Customer Success Manager, or info@instructure.com. The SOC 3 report and ISO 27001 Certificate for Mastery Connect is included in the Mastery Connect Security Package.





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