Proprietary & Confidential

GitHub

Enterprise Cloud

SOC 1

Report on Management's Description
of a Service Organization's System and the Suitability
of the Design and Operating Effectiveness of Controls

Integrated SOC 1 Type 2 Report Prepared in Accordance with the AICPA Attestation Standards and IAASB ISAE No. 3402 Standards

OCTOBER 1, 2020 THROUGH SEPTEMBER 30, 2021

MOSSADAMS

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I. Independent Service Auditor's Report

GitHub, Inc.
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To the Management of GitHub:

Scope

We have examined GitHub's description of its Enterprise Cloud entitled "Description of GitHub's Enterprise Cloud" for processing user entities' transactions throughout the period October 1, 2020 to September 30, 2021 (description) and the suitability of the design and operating effectiveness of controls included in the description to achieve the related control objectives stated in the description, based on the criteria identified in "GitHub's Assertion" (assertion). The controls and control objectives included in the description are those that management of GitHub believes are likely to be relevant to user entities' internal control over financial reporting, and the description does not include those aspects of the Enterprise Cloud that are not likely to be relevant to user entities' internal control over financial reporting.

The information included in Section V titled "Other Information Provided by GitHub That Is Not Covered by the Service Auditor's Report" is presented by GitHub management to provide additional information and is not a part of GitHub's description of its Enterprise Cloud System made available to user entities during the period October 1, 2020 to September 30, 2021. Information about GitHub's Management's Response to Identified Testing Exceptions as not been subjected to the procedures applied in the examination of the description of the Enterprise Cloud System and of the suitability of the design and operating effectiveness of the controls to achieve the related control objectives stated in the description of the Enterprise Cloud System, and accordingly, we express no opinion on it.

GitHub uses multiple subservice organizations for colocation data center services and infrastructure hosting. The description includes only the control objectives and related controls of GitHub and excludes the control objectives and related controls at the subservice organizations. The description also indicates that certain control objectives specified by GitHub can be achieved only if complementary subservice organization controls assumed in the design of GitHub's controls are suitably designed and operating effectively, along with the related controls at GitHub. Our examination did not extend to controls at the subservice organizations, and we have not evaluated the suitability of the design or operating effectiveness of such complementary subservice organization controls.

The description indicates that certain control objectives specified in the description can be achieved only if complementary user entity controls assumed in the design of GitHub's controls are suitably designed and operating effectively, along with related controls at the service organization. Our examination did not extend to such complementary user entity controls, and we have not evaluated the suitability of the design or operating effectiveness of such complementary user entity controls.

Service Organization's Responsibilities

In Section II, GitHub has provided an assertion about the fairness of the presentation of the description and suitability of the design and operating effectiveness of the controls to achieve the related control objectives stated in the description. GitHub is responsible for preparing the description and its assertion, including the completeness, accuracy, and method of presentation of the description and assertion, providing the services covered by the description, specifying the control objectives and stating them in the description, identifying the risks that threaten the achievement of the control objectives, selecting the criteria stated in the assertion, and designing, implementing, and documenting controls that are suitably designed and operating effectively to achieve the related control objectives stated in the description.

Service Auditor's Responsibilities

Our responsibility is to express an opinion on the fairness of the presentation of the description and on the suitability of the design and operating effectiveness of the controls to achieve the related control objectives stated in the description, based on our examination.

Our examination was conducted in accordance with attestation standards established by the American Institute of Certified Public Accountants and in accordance with International Standard on Assurance Engagements 3402, *Assurance Reports on Controls at a Service Organization*, issued by the International Auditing and Assurance Standards Board. Those standards require that we plan and perform the examination to obtain reasonable assurance about whether, in all material respects, based on the criteria in management's assertion, the description is fairly presented and the controls were suitably designed and operating effectively to achieve the related control objectives stated in the description throughout the period October 1, 2020 to September 30, 2021. We believe that the evidence we obtained is sufficient and appropriate to provide a reasonable basis for our opinion.

An examination of a description of a service organization's system and the suitability of the design and operating effectiveness of controls involves:

- performing procedures to obtain evidence about the fairness of the presentation of the description and the suitability of the design and operating effectiveness of the controls to achieve the related control objectives stated in the description, based on the criteria in management's assertion.
- assessing the risks that the description is not fairly presented and that the controls were not suitably designed or operating effectively to achieve the related control objectives stated in the description.
- testing the operating effectiveness of those controls that management considers necessary to provide reasonable assurance that the related control objectives stated in the description were achieved.
- evaluating the overall presentation of the description, suitability of the control objectives stated in the description, and suitability of the criteria specified by the service organization in its assertion.

Service Auditor's Independence and Quality Control

We have complied with the independence and other ethical requirements of the Code of Professional Conduct established by the AICPA.

We applied the Statements on Quality Control Standards established by the AICPA and, accordingly, maintain a comprehensive system of quality control.

Inherent Limitations

The description is prepared to meet the common needs of a broad range of user entities and their auditors who audit and report on user entities' financial statements and may not, therefore, include every aspect of the system that each individual user entity may consider important in its own particular environment. Because of their nature, controls at a service organization may not prevent, or detect and correct, all misstatements in processing or reporting transactions. Also, the projection to the future of any evaluation of the fairness of the presentation of the description, or conclusions about the suitability of the design or operating effectiveness of the controls to achieve the related control objectives, is subject to the risk that controls at a service organization may become ineffective.

Description of Tests of Controls

The specific controls tested and the nature, timing, and results of those tests are listed in Section IV.

Opinion

In our opinion, in all material respects, based on the criteria described in GitHub's assertion:

- the description fairly presents the Enterprise Cloud that was designed and implemented throughout the period October 1, 2020 to September 30, 2021.
- the controls related to the control objectives stated in the description were suitably designed to provide reasonable assurance that the control objectives would be achieved if the controls operated effectively throughout the period October 1, 2020 to September 30, 2021, and the subservice organizations and user entities applied the complementary controls assumed in the design of GitHub's controls throughout the period October 1, 2020 to September 30, 2021.
- the controls operated effectively to provide reasonable assurance that the control objectives stated in the description were achieved throughout the period October 1, 2020 to September 30, 2021, if complementary subservice organization and user entity controls assumed in the design of GitHub's controls operated effectively throughout the period October 1, 2020 to September 30, 2021.

Restricted Use

This report, including the description of tests of controls and results thereof in Section IV, is intended solely for the information and use of GitHub, user entities of GitHub's Enterprise Cloud during some or all of the period October 1, 2020 to September 30, 2021, and their auditors who audit and report on such user entities' financial statements or internal control over financial reporting and have a sufficient understanding to consider it, along with other information, including information about controls implemented by user entities themselves, when assessing the risks of material misstatements of user entities' financial statements. This report is not intended to be and should not be used by anyone other than these specified parties.

Moss Adams LLP

November 12, 2021

II. GitHub's Assertion

We have prepared the description of GitHub's Enterprise Cloud entitled "Description of GitHub's Enterprise Cloud" for processing user entities' transactions throughout the period October 1, 2020 to September 30, 2021 (description) for user entities of the system during some or all of the period October 1, 2020 to September 30, 2021, and their auditors who audit and report on such user entities' financial statements or internal control over financial reporting and have a sufficient understanding to consider it, along with other information, including information about controls implemented by subservice organizations and user entities of the system themselves, when assessing the risks of material misstatements of user entities' financial statements.

GitHub uses multiple subservice organizations for colocation data center services and infrastructure hosting. The description includes only the control objectives and related controls of GitHub and excludes the control objectives and related controls of the subservice organizations. The description also indicates that certain control objectives specified in the description can be achieved only if complementary subservice organization controls assumed in the design of our controls are suitably designed and operating effectively, along with the related controls. The description does not extend to controls at the subservice organizations.

The description indicates that certain control objectives specified in the description can be achieved only if complementary user entity controls assumed in the design of GitHub's controls are suitably designed and operating effectively, along with related controls at the service organization. The description does not extend to controls of the user entities.

We confirm, to the best of our knowledge and belief, that:

a. The description fairly presents the Enterprise Cloud made available to user entities of the system during some or all of the period October 1, 2020 to September 30, 2021 for processing their transactions as it relates to controls that are likely to be relevant to user entities' internal control over financial reporting. The criteria we used in making this assertion were that the description

   i. presents how the system made available to user entities of the system was designed and implemented to process relevant transactions, including, if applicable,

      (1) the types of services provided, including, as appropriate, the classes of transactions processed.

      (2) the procedures, within both automated and manual systems, by which those services are provided, including, as appropriate, procedures by which transactions are initiated, authorized, recorded, processed, corrected as necessary, and transferred to the reports and other information prepared for user entities of the system.

      (3) the information used in the performance of the procedures including, if applicable, related accounting records, whether electronic or manual, and supporting information involved in initiating, authorizing, recording, processing, and reporting transactions; this includes the correction of incorrect information and how information is transferred to the reports and other information prepared for user entities.

(4) how the system captures and addresses significant events and conditions other than transactions.

(5) the process used to prepare reports and other information for user entities.

(6) services performed by a subservice organization, if any, including whether the inclusive method or the carve-out method has been used in relation to them.

(7) the specified control objectives and controls designed to achieve those objectives, including, as applicable, complementary user entity controls and complementary subservice organization controls assumed in the design of the service organization's controls.

(8) other aspects of our control environment, risk assessment process, information and communications (including the related business processes), control activities, and monitoring activities that are relevant to the services provided.

ii. includes relevant details of changes to the service organization's system during the period covered by the description.

iii. does not omit or distort information relevant to the service organization's system, while acknowledging that the description is prepared to meet the common needs of a broad range of user entities of the system and the user auditors, and may not, therefore, include every aspect of the Enterprise Cloud that each individual user entity of the system and its auditor may consider important in its own particular environment.

b. the controls related to the control objectives stated in the description were suitably designed and operating effectively throughout the period October 1, 2020 to September 30, 2021 to achieve those control objectives if subservice organizations and user entities applied the complementary controls assumed in the design of GitHub's controls throughout the period October 1, 2020 to September 30, 2021. The criteria we used in making this assertion were that

i. the risks that threaten the achievement of the control objectives stated in the description have been identified by management of the service organization.

ii. the controls identified in the description would, if operating effectively, provide reasonable assurance that those risks would not prevent the control objectives stated in the description from being achieved.

iii. the controls were consistently applied as designed, including whether manual controls were applied by individuals who have the appropriate competence and authority.

III. Description of GitHub's Enterprise Cloud

A. Overview of GitHub

COMPANY OVERVIEW

GitHub, an independently operated Microsoft subsidiary, generated its first commit in 2007. It's headquartered in San Francisco, California, with additional offices in Bellevue, WA; Raleigh, NC; Oxford, UK; Tokyo, Japan; Hyderabad, India and Amsterdam, Netherlands. GitHub currently employs approximately 2,100 employees, with approximately 70 percent of the workforce remote.

SYSTEM DESCRIPTION

GitHub is a web-based software development platform built on the Git version control software. Primarily used for software code, GitHub offers the distributed version control and source code management functionality of Git with additional features and enhancements. Specifically, it provides access control and several collaboration features including bug tracking, feature requests, task management, and wikis.

GitHub's Enterprise Cloud is GitHub's SaaS solution for collaborative software development. Features of the Enterprise Cloud service include organizations, code hosting, code management, project management, team management, and documentation.

ORGANIZATIONS

An organization is a collection of user accounts that owns repositories. Organizations have one or more owners, who have administrative privileges for the organization. When a user creates an organization, it does not have any repositories associated with it. At any time, members of the organization with the Owner role can add new repositories or transfer existing repositories.

CODE HOSTING

GitHub is one of the largest code hosts in the world with millions of projects. Private, public, or open-source repositories are equipped with tools to host, version, and release code. Unlimited private repositories allow keeping the code in one place, even when using Subversion (SVN) or working with large files using Git Large File Storage (LFS).

Changes can be made to code in precise commits allowing for quick searches on commit messages in the revision history to find a change. In addition, blame view enables users to trace changes and discover how the file, and code base, has evolved.

With sharing, changes can be packaged from a recently closed milestone or finished project into a new release. Users can draft and publish release notes, publish pre-release versions, attached files, and link directly to the latest download.

CODE MANAGEMENT

Code review is critical path to better code, and it's fundamental to how GitHub works. Built-in review tools make code review an essential part of team development workflows.

A pull request (PR) is a living conversation where ideas can be shared, tasks assigned, details discussed, and reviews conducted. Reviews happen faster when GitHub shows a user exactly what has changed. Diffs compare versions of source code side by side, highlighting the parts that are new, edited, or deleted.

PRs also enable clear feedback, review requests, and comments in context with comment threads within the code. Comments may be bundled into one review or in reply to someone else's comments inline as a conversation.

Protected branches allow for better quality code management. Repositories can be configured to require status checks, such as continuous integration tests, reducing both human error and administrative overhead.

PROJECT MANAGEMENT

Project boards allow users to reference every issue and PR in a card, providing a drag-and-droppable snapshot of the work that teams do in a repository. This feature can also function as an agile idea board to capture early ideas that come up as part of a standup or team sync, without polluting the issues.

Issues enable team task tracking, with resources identified and assigned tasks within a team. Issues may be used to track a bug, discuss an idea with an @mention, or start distributing work. Issue and PR assignments to one or more teammates make it clear who is doing what work and what feedback and approvals have been requested.

Milestones can be added to issues or PRs to organize and track progress on groups of issues or PRs in a repository.

TEAM MANAGEMENT

Building software is as much about managing teams and communities as it is about code. Users set roles and expectations without starting from scratch. Customized common codes of conduct can be created for any project, with pre-written licenses available right from the repository.

GitHub Teams organizes people, provides level-up access with administrative roles, and tunes permissions for nested teams. Discussion threads keep conversations on topic using moderation tools, like issue and pull request locking, to help teams stay focused on code. For maintaining open-source projects, user blocking reduces noise and keeps conversations productive.

DOCUMENTATION

GitHub allows for documentation to be created and maintained in any repository, and wikis are available to create documentation with version control. Each wiki is its own repository, so every change is versioned and comparable. With a text editor, users can add docs in the text formatting language of choice, such as Textile or GitHub Flavored Markdown.

B. System Boundaries

The scope of this report includes the GitHub Enterprise Cloud, and the supporting production systems, infrastructure, software, people, procedures, and data. GitHub offers both hosted and customer on-premise versions. However, the GitHub Enterprise On-premise, Jobs, and Pages services are excluded from the scope of this report.

C. Subservice Organizations

GitHub uses multiple subservice organizations in conjunction with providing its Enterprise Cloud product. GitHub uses Sabey, QTS, Coresite, and Equinix to provide colocation data center services, and Amazon Web Services (AWS) and Microsoft Azure (Azure) to provide infrastructure hosting and support. These subservice organizations are excluded from the scope of this report. The expected controls for which they are responsible are found in a subsequent section titled Complementary Subservice Organization Controls.

D. Scope of the Description

This description of GitHub's Enterprise Cloud addresses only GitHub's Enterprise Cloud provided to its user entities and excludes other services provided by GitHub. The description is intended to provide information for user entities of the Enterprise Cloud and their independent auditors who audit and report on such user entities' financial statements to be used in obtaining an understanding of the Enterprise Cloud and the controls over that system that are likely to be relevant to user entities' internal control over financial reporting. The description of the system includes certain business process controls and IT general controls that support the delivery of GitHub's Enterprise Cloud.

E. Internal Control Framework

This section provides information about the five interrelated components of internal control at GitHub, including GitHub's:

- Control Environment
- Risk Assessment
- Control Activities
- Information and Communications
- Monitoring Activities

1. Control Environment

The internal control environment reflects the overall attitude, awareness, and actions of executive management and other stakeholders concerning the importance of controls and the emphasis given to controls in the company's policies, procedures, methods, and organizational structure.

Management is responsible for directing and controlling operations and for establishing, communicating, and monitoring policies and procedures. Maintaining sound internal controls and establishing the integrity and ethical values of personnel is a critical management function.

CODE OF CONDUCT

During the onboarding process, new employees complete security and privacy awareness training and review and acknowledge the employee guide to company policies and practices, the Hubber Handbook. The Handbook includes the GitHub Standard of Conduct, Security Policy Awareness and Responsibilities, and other information security topics.

ORGANIZATIONAL STRUCTURE

GitHub's organizational structure provides the framework within which its activities for achieving company-wide objectives and key results are defined, planned, sponsored, executed, controlled, and monitored. Management believes that establishing a relevant organizational structure includes considering key areas of authority and responsibility and lines of reporting.

GitHub has established appropriate lines of reporting considering the nature, size, and culture of the company. GitHub maintains an organizational chart that outlines security responsibilities across the company. The organizational chart is available for employees both on GitHub's intranet and internal HRIS (Human Resource Information System). Management continues to evaluate its organizational structure and makes changes as necessary.

GitHub's organizational structure is designed to meet the company's security commitments and requirements to customers. GitHub's Senior Leadership team, specifically those reporting to the Chief Executive Officer (CEO), provide direction and oversight. In addition, management is responsible for establishing, communicating, and monitoring policies and procedures as well as aligning operations with leadership's defined objectives and key results. The Senior Leadership team is independent from control operations. Individuals with control execution responsibilities do not directly report to the Senior Leadership team.

When leadership changes occur within the organization, the Security team is notified where there may be a compliance impact. New incoming leadership is announced to the organization on the company intranet, and in regular all-hands meetings.

The Security team, headed by the Chief Security Officer (CSO), is responsible for monitoring and enhancing GitHub's overall security posture. This function includes managing security risks and threats, educating employees on security-related best practices, building security awareness, responding to security incidents, and performing internal security audits and security reviews. Security leadership considers out-of-band changes based on newly identified risk findings or service changes.

Security leadership is also accountable for planning and staffing appropriately to address risk remediation and mitigation as identified in prescribed risk monitoring activities. Security leadership reviews these components as part of an annual headcount and budgeting process.

Management across the company is accountable for ensuring necessary policy, standards, and standard operating procedures aid in assessing and addressing operational risks. These owners review and update these policy-related documents at least annually, to reflect changes and help ensure completeness and accuracy, based upon the annual risk assessment, strategic business initiatives driven by leadership, and other events that dictate changes. Security leadership reviews and approves the materials and any changes on an annual basis.

The Security Governance Risk and Controls (GRC) team administers security awareness training to personnel during their new hire onboarding, and on an annual basis thereafter. The Security team follows up with employees who are delinquent in completing the training until these employees are compliant. Moreover, periodic security awareness notifications are sent to employees as needed, highlighting new controls or warning them of known threats.

Members of the Engineering team (developers) participate in training upon hire in order to remind, reinforce, and educate them about building security into code and secure coding practices. Training content is re-evaluated and reinforced over time as changes to the code base or languages require.

HUMAN RESOURCES (HR)

GitHub evaluates candidates' abilities in the interview process against established job descriptions. Fit to the role is scored, tracked, and approved by the hiring manager in GitHub's recruitment management system.

In order to be employed by GitHub, candidates must successfully complete a background check. The background check is initiated after the candidate signs the offer letter. Employees are not allowed to onboard until the background check is cleared. The Talent Coordinator is notified once a candidate clears, which is then relayed to the hiring manager. In instances where negative or incomplete information is obtained, the Sr. Director of Talent Acquisition, or a delegate, assesses, in consultation with Legal, the potential risk and liabilities related to the job's requirements and makes a final decision on the hire.

Before any adverse action is taken based on a background check, GitHub provides the applicant with a notice that includes an opportunity to respond or clarify any discrepancies. If GitHub does not hire a candidate based on the results of a background check, GitHub provides the candidate with an adverse-action notice and informs them of their rights to see the information reported and to correct inaccurate information.

New employees undergo a weeklong onboarding session, at which time they are provisioned with a company-issued laptop and their GitHub organization and relevant system credentials as commensurate with their new role. During their first week, new employees are introduced to the roles of Security, GRC, and Data Protection in GitHub and are required to complete the Security and Privacy Awareness training.

Additionally, product engineers hired to work on the Enterprise Cloud application and services complete Secure Coding Practices training. This training includes existing engineering employees retaking the training when a refresh is required on coding best practices to help ensure engineers align with changes in the code base or development tools.

2. Risk Assessment

GitHub recognizes that risk management is a critical component of its operations and contributes to ensuring customer data is properly protected. GitHub incorporates risk management throughout its business processes and across the organization. The foundation of this process is management's knowledge of its operations, its close working relationship with its customers and vendors, and its understanding of the space in which it operates.

The Security GRC team is embedded within the larger Security team. This team monitors the internal controls and conducts risk monitoring in accordance with relevant regulatory and contractual compliance requirements. This responsibility includes managing the design, implementation, and monitoring of the Enterprise Cloud control environment, as well as assessing, monitoring, and mitigating security and compliance risks.

RISK IDENTIFICATION

GitHub has defined risk management processes to identify and manage risks that may affect the system's security. At least annually, Security leadership performs a risk assessment to identify and evaluate potential threats to the effectiveness of the control environment.

RISK MITIGATION

A risk register is created as part of the annual risk assessment. The Security GRC team maintains the risk register with updates from the broader Security team to help ensure security and technology-related compliance risks are identified, tracked, and mitigated.

RISK REPORTING

Summary reporting on security risk areas is included in annual leadership reporting as part of the annual security risk assessment. Leadership, including Security leadership and the Senior Vice President of Technology, reviews and approves this annual risk report.

3. Monitoring Activities

The Security GRC team at GitHub is responsible for monitoring the internal control environment for each of the compliance frameworks adopted by GitHub. Specifically, the Security GRC team conducts internal control assessments annually to assess the effectiveness of the internal control environment. Control assessment results are documented in internal GitHub repositories. Issues are identified and escalated to the relevant internal teams to resolve control design or effectiveness issues, and the status of the operating effectiveness of controls, identified gaps, and remediation efforts are reported up to the Senior Leadership team for awareness on a quarterly basis.

4. Information and Communications

To help align GitHub business strategies and goals with operating performance, management is committed to maintaining effective communication with employees and customers.

INTERNAL COMMUNICATIONS

GitHub has published policies and procedures, both included in the Hubber Handbook and published separately, outlining the responsibility of employees to report security and operational failures, incidents, system problems, and complaints. The document owner(s) and Security leadership review and approve security policies and procedures annually. Significant changes to policies result in communication to personnel regarding policy updates.

Every Hubber, depending on their role, is responsible for designing and executing work and services in a secure manner in alignment with company standards and policies, and for reporting issues and findings that impact security up their management chain or directly to the Security team.

EXTERNAL COMMUNICATIONS

GitHub communicates the description of Enterprise Cloud systems, features, responsibilities, customer commitments, and instructions to report incidents and complaints using the external sites website (https://blog.github.com). The blog maintains a changelog, which is a chronological list of information on customer-facing feature changes, bug fixes, or security notifications made available to end users. GitHub's changelog is live on the blog site (https://blog.github.com/changelog) and available for RSS feed subscription. It is also accessible via Atom feed and GitHub's Changelog twitter account (@GHChangelog).

Enterprise Cloud users have ready access to support resources at GitHub Help (https://help.github.com) and GitHub Guides (https://guides.github.com), and they can access customized feature tutorials through the GitHub Learning Labs (https://lab.github.com).

Customer commitments and responsibilities are communicated through GitHub's Terms of Service (https://help.GitHub.com/articles/GitHub-terms-of-service/) and in contracts. The Terms of Service includes GitHub's customer Acceptable Use Policy, which provides the basic rules customers are required to follow as members of the community on the Enterprise Cloud product.

The user community can communicate directly with GitHub. GitHub Support receives reports of security issues and many other end-user concerns and questions via email or through the 'Contact Us' web form. There is a defined process using the customer-facing ticketing system, Halp, for managing, investigating, and resolving these types of issues in a timely manner.

5. Control Activities

a) Physical and Logical Access

EMPLOYEE AUTHENTICATION

GitHub has implemented access protection measures to only allow authenticated and authorized users access to the portions of GitHub's instance of the Enterprise Cloud instance that are not explicitly public. Enterprise Cloud requires a valid and unique account ID, password, and two-factor authentication (2FA). Internal GitHub users leverage the same mechanisms that GitHub customers use within GitHub Enterprise Cloud. In addition, GitHub has chosen to integrate with a third-party, single sign-on (SSO) provider.

Access to internal systems is restricted through unique account IDs ("handles"), password, and 2FA. To access these environments, GitHub users leverage the same GitHub handles as GitHub Enterprise Cloud; however, the authentication to these systems is not integrated. Employees are prohibited by policy from using shared accounts or credentials when accessing GitHub internal systems. Employee access to Enterprise Cloud production systems is restricted to authorized personnel with demonstrated need and isolated from the internet by virtual private network (VPN), bastion hosts, and/or Security Assertion Markup Language (SAML) enforcing Hypertext Transport Protocol Security (HTTPS) reverse proxy.

Employee access to production infrastructure is approved at the time of initial access grant and that approval is validated during periodic access reviews. Individual users, teams and managers request and manage access via the GitHub Entitlements system. The Security Operations team has ultimate responsibility for granting and maintaining this Entitlements system. The VP of Security approves major changes to systems and process.

In addition, perimeter access systems automatically disconnect users after a period of inactivity and require 2FA.

CUSTOMER AUTHENTICATION

Access to customer organizations requires a unique account and password. If elected, customers can enable 2FA for their organization through Enterprise Cloud settings. Audit logging is also available to allow organization administrators to quickly review user actions performed. This log includes details such as who performed the action, what the action was, and when it was performed.

Where a repository is configured as private, GitHub Enterprise Cloud is designed to limit access to data and settings to the user who created the repository or who has been explicitly granted access.

GitHub file servers are obfuscated from front-end applications, where each Git operation, such as read, commit, or push in a repository is directed through GitHub's authentication pathway using service handlers. Requests terminate at the Git proxy servers where GitAuth, the service handler endpoint, is executed to perform authentication and repository permission checks.

GitAuth checks whether the requested repository is active or disabled, is public or private, and checks the user permissions and authentication information (e.g., anonymous user for public only access, username and password, OAuth token, or SSH keys). If the service provides a successful response for the authentication and permission check, GitAuth returns the routing information for access to the file server host where the repository can be found. If the response is denied, the request returns a 404 error.

USER PROVISIONING

New employee permissions are added during the onboarding process based on predefined permissions granted to individuals based on their team and their role within that team. The user's manager and Security Operations review and approve any additional privileges granted outside of those provisioned as part of their role. Security Operations grants elevated access above their predefined roles after obtaining approvals from management and Security Operations.

During onboarding, GitHub IT shepherds employees through configuring their account setup, 2FA, and secondary mobile device authentication tools for GitHub's SSO provider, and GitHub organization. IT monitors the access configuration, and users are locked out of internal resources until remediated if they are found to not have required security settings enabled in accordance with requirements.

The Security team reviews sensitive logical access to critical production and access gateway systems semi-annually. Security Operations identifies systems and elevated access that pose significant risk to the organization. These systems include production, security management tools, user access tools, and vulnerability management tools. The reviews verify whether terminated users have been removed from the systems and whether active access levels are appropriate. User access levels remaining after changes from the review are authorized by management or removed if approval is not granted

The Infrastructure team reviews physical data center access annually. Accounts belonging to unapproved individuals are removed.

The SIRT monitors user access events to identify anomalous user access activity. If the SIRT concludes the activity is potentially malicious, the account is locked to reduce risk of unauthorized access and incident response procedures are initiated.

Deprovisioning occurs on the day of an employee's termination. An offboarding notification to Security Operations is pulled from Workday, where HR updates employee termination dates, for both planned and unplanned exits. The Security Operations team works off an exit process list, with aspects of account termination being automated, driven through LDAP changes or through manual account turn downs.

The timeframe for completing access removals for corporate and production network resources, and physical access, is within 24 hours of notification of the termination. High-risk access is deprovisioned first, helping to ensure a terminated employee can no longer access GitHub's internal resources.

b) *Information Security*

POLICIES AND PROCEDURES

GitHub has published policies and procedures, both included in the Hubber Handbook and published separately, outlining the responsibility of employees to report security and operational failures, incidents, system problems, and complaints. The document owner(s) and Security leadership review and approve security policies and procedures annually. Significant changes to policies result in communication to personnel regarding policy updates.

Every Hubber, depending on their role, is responsible for designing and executing work and services in a secure manner, in alignment with company standards and policies, and for reporting issues and findings that impact security up their management chain or directly to the Security team.

GitHub policies establish procedures and controls to enable security, efficiency, availability, and quality of service. The GitHub Entity Security Policy and related policy statements define information security practices, roles, and responsibilities. The Entity Security Policy outlines the security roles and responsibilities for the organization and expectations for employees, contractors, and third parties utilizing GitHub systems or data.

VULNERABILITY MANAGEMENT:

The GitHub Vulnerability Management Program monitors and interrogates public-facing and internal infrastructure to identify systems vulnerable to known exploits, configured in ways that unnecessarily increase risk of compromise, or with software installed that is known to be insecure. The program develops and maintains scanning coverage across hosting platforms, providers, and networks. Vulnerability scanning is executed on a weekly basis, with findings prioritized for remediation based on risk and technology dependencies and addressed based on risk and exposure.

GitHub has a published internal standard based on the Common Vulnerability Scoring System (CVSS) levels for vulnerability management (critical, high, medium, and low) as reported by GitHub's scanning vendor. GitHub's Vulnerability Management team uses the CVSS score for initial vulnerability assessment, and then conducts an impact analysis that takes into consideration the specifics of the infrastructure. When a credible and actionable vulnerability is identified, the Vulnerability Management team provides the system owner with a description of the perceived impact of the vulnerability and the required timetable for resolution/mitigation.

GitHub Application Security, Vulnerability Management Engineering, and Infrastructure teams triage vulnerabilities from vendors and internal and external scanning, and patch those vulnerabilities based on risk and exposure. GitHub prefers to run "known good" software that has been tested and operated in production. Preference is given to running the most stable release of software possible. Patches are not generally applied for the objective of running the latest or "bleeding-edge" version of any package.

Patching occurs to address security fixes, bug-fixes, performance issues, and to accommodate new features. Patches are applied through a combination of automated and manual processes. Linux servers automatically install most security patches via an unattended upgrade process that is orchestrated by GitHub's configuration management system.

In addition to the production network vulnerability assessments, the GitHub Application Security team provides application security services to the Engineering teams. These services include secure architecture and code review, developing and maintaining internal automated security testing, and secure code training.

BUG BOUNTY

The Application Security team manages the GitHub Security bug bounty program, hosted by HackerOne. Members of the GitHub community are encouraged to submit vulnerabilities through the program to the Application Security team, who manages triage, risk assessments, remediation efforts, and issues bounty rewards for significant finds leading to security improvements to the platform.

PENETRATION TESTING

GitHub engages with a third-party security vendor to execute penetration and application security testing annually. The scope of this testing varies from year to year to focus on areas assessed as presenting significant risk, such as new features or services. Results are triaged and the risks reported are assessed against internal environmental considerations. Where remediation is required, solutions are identified and assigned to the relevant engineering teams for resolution with appropriate prioritization. Upon remediation, the fixes performed are shared with the contracted vendor to confirm successful remediation. A customer-facing report of the annual security testing is available to clients under mutual non-disclosure agreements.

SYSTEM HARDENING

System hardening standards have been documented, based on GitHub security practices. The Security team reviews and approves hardening procedures each year.

Hardened system configurations are maintained in GitHub source code repositories and are deployed to production through a configuration management tool. This configuration management tool monitors system configurations and reverts out-of-compliance systems to the approved baseline.

Changes to the configurations are peer reviewed and approved prior to deploying the changes to production. Change activities are logged in the GitHub repository.

NETWORK SECURITY

GitHub's network security is enforced through a number of process and configuration controls to protect against unauthorized access and help ensure security of data in transit. Both stateless and stateful network firewalls restrict external points of connectivity and prevent unauthorized traffic from beyond the system boundary.

Access to production systems is brokered through security gateway systems at the production network perimeter. Three technologies provide access: VPN, bastion host, and Security Sockets Layer (SSL) reverse proxy. Each of these remote access mechanisms require multiple factors for authentication and employ strong encryption in transit. Employees are provided access to production systems based on their role within the organization. Access is granted through configuration management, which updates the internal LDAP store with the correct authorization rights for the user.

To help ensure the integrity of the environment, protections include requirements for operators when connecting to and working in the production network. Machine accounts are required for processes. Access to machine accounts are limited and activity is logged and audited. Access to production systems requires the use of an authorized secure shell (SSH) key with 2FA enabled.

When users need to elevate their privileges and run commands with sudo, they do so with their individual accounts. Additionally, users have the ability to sudo to root. Any of these actions require using the sudo command and are logged in the security information and event management tool. Commands executed by employees outside the core Production Engineering team are communicated to the Security Incident Response team (SIRT). The SIRT reviews the issue, including a report of the weekly sudo and root activity and the hosts impacted, and follows up to help ensure the actions are appropriate. If needed, the SIRT identifies process improvements to reduce human interactions directly with production servers.

SYSTEM MONITORING

The SIRT actively instruments and monitors a broad variety of logs and other telemetry sources across the organization. Production systems and corporate infrastructure transmitting, processing, or storing GitHub data are configured to generate and transmit security event logs. These include:

- *Datacenter* – system, application logs, and network telemetry
- *Corporate* – endpoint system, network telemetry, and cloud service and application logs

These logs are actively monitored for a variety of known security issues and other anomalous activity. GitHub maintains a comprehensive security detection framework that governs how threat and anomaly detection is performed.

Detections are generated by a variety of systems including log query tools, network or endpoint monitoring systems, or orchestration tooling. Each detection is assigned a severity and initial response SLA based on the risk represented by the event(s) it is designed to detect and surface. SLAs are as follows:

Severity	SLA	Intended Response	Example
Critical	30 minutes – 24/7	Immediate human response	Lost device
High	24 hours	Human response within one day	High confidence IOC match or behavioral detection
Medium	1-7 days	Automated or human response within a week	Low confidence IOC match
Low	N/A	Automated response or contextual only	Uptick in password changes from a single IP

Each alert generated by detection monitoring is assigned to the relevant security team or accountable individual at the time of creation, based on the severity assigned. The assigned team or individual records any actions taken or post-mortem conclusions in the relevant security repository issue for that event and resolves the issue when complete.

INCIDENT RESPONSE

The SIRT triages, investigates, and responds to a variety of security events reported by internal and external sources, including but not limited to:

- Suspected internal security compromises
- Critical dotcom vulnerabilities or bugs that may expose user or customer data
- GitHub or customer credential/secret exposure
- External requests for information on dotcom contents or fetches/page views in support of user or customer security incidents
- External requests for dotcom content takedown reported by users or customers

GitHub maintains documented incident response procedures. These procedures are triggered once an event is detected and reported. GitHub security personnel are informed of security events, whether detected by systems or reported by humans, internal or external, through formally documented procedures, with alerts surfaced to responders based on their severity.

Initial reports are defined as events until appropriately triaged by a member of the SIRT. Once the SIRT verifies an incident, an escalation procedure is executed to engage appropriate resources to help ensure any potential risk of breach or privacy concerns are addressed in accordance with established protocols. Cross-functional accountabilities are documented for reference as escalation and remediation engagement varies depending on the source, scope of impact, and severity of the incident.

Roles for incident response and handling are defined and assigned, and a multi-stage process is followed until the risk has been mitigated and the outcomes documented. Root cause is assessed and addressed as part of the incident response process.

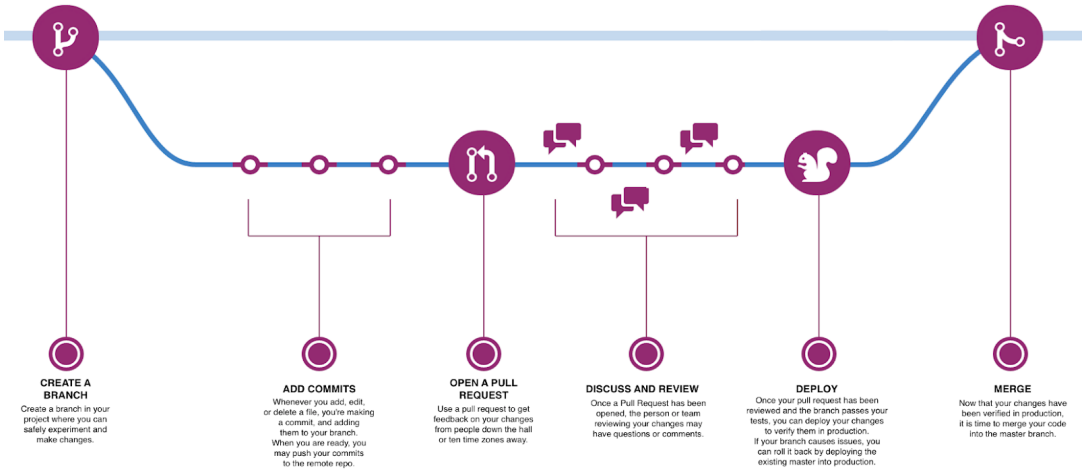
The SIRT also documents Legal engagement and external notification processes in the event an incident is validated as a breach or in violation of contractual commitments. GitHub informs affected users and organizations as required, directly via email. Investigations specific to an affected customer would be managed directly with that customer, in accordance with contractual terms.

c) *Change Management*

GitHub is a collaborative, organic, and adaptable organization. Code change management is GitHub's bread and butter. Feature development, internal software, and bug fixes travel various paths prior to being released, yet code changes within GitHub's application and services, production systems, and security tooling are managed with consistency through change management processes enforced within the GitHub Enterprise Cloud platform.

CHANGE DEVELOPMENT

GitHub application and configuration changes are developed and maintained within GitHub's private instance on the Enterprise Cloud platform. Individual engineers are grouped by teams based on their areas of code ownership and expertise. Access to branch, push, approve, and merge changes to GitHub repositories is restricted to members of the Infrastructure and Product Engineering teams. Engineers responsible for that section of the codebase receive timely notifications of changes pushed and deployed and monitor these changes through automated issues posted in the Enterprise Cloud repositories and in Slack.



When developing code for the Enterprise Cloud platform, engineers create a branch from the Master, which is the 'gold copy' of GitHub, to begin development of changes. Changes made on these branches are deployed to a pre-production environment for testing. Once pre-production testing has validated the change is functioning as expected, the branch is committed to Master where it is then deployed to production for customer use.

An automated static code analysis tool runs every time new code is committed, to detect insecure coding practices based on third-party provided lexical, syntactic, and semantic rulesets, in addition to GitHub developed rulesets and test scenarios. An automated alerting issue is posted on the containing issue and in a tracking repository maintained by the Application Security team, to alert them of any potentially insecure coding risks to product development.

PEER REVIEW

GitHub relies heavily on collaboration and peer reviews to help ensure the integrity of the systems. Engineers are trained on the requirements for performing an effective peer review, and each team overlays domain-specific training and checks to the review. The Security team conducts high-level design reviews, including security reviews, and release reviews for large projects and initiatives to assess risk. For production changes, a code review and, where relevant, a review of database schema occurs to verify the integrity of the changes.

Once the code is ready for discussion and review, developers open a PR on their branch. The PR is a tool built within GitHub to coordinate the approval, testing, and deployment of changes, and significant changes to production code require a PR.

The GitHub code repository defines a group of subject experts who are qualified to review and approve code changes, code owners. The code owners file in each repository has a catch-all group to help ensure reviewers are alerted of any changes.

Code owners review changes and help ensure critical change control activities are completed, including required testing, automated security scanning, and post deployment monitoring prior to pushing the code to production and merging the code back into Master as the new stable revision. Protected branches are also enabled on the Enterprise Cloud code repository, requiring branches to be peer-reviewed by a team maintainer, who is separate from the developer, prior to merging the code to Master.

AUTOMATED TESTING

Continuous integration (CI) is the process by which code changes are automatically tested and reported. When a change is pushed to a repository branch or to a repository branch with an associated PR, the CI system automatically executes the configured CI status checks for that repository.

This process includes the following:

- CI is notified of changes to the repo and builds the code for testing
- CI runs the test suites selected for that repository including end-to-end integration testing, functional/unit testing, and security testing
- CI successes and failures are referenced in the PR
- Failures in CI will block merging and deploying of those changes

CI testing occurs every time a change is committed and when a change is being deployed to production. GitHub continuous integration testing uses a suite of tools to automate build and test on isolated hosts. Test results are automatically exported and alerted on the respective issues allowing teams to monitor and act upon issues prior to deployment.

GitHub engineers collaborate to support the creation of continuous integration test scripts, and the implementation of blocking acceptance tests. These acceptance tests typically function at the browser level, and focus on the overall functionality of the module or application to help ensure customer commitments and system requirements are met. The change deployment system prevents any change from deployment to production if required acceptance tests have not passed.

Peer review is the primary method used by GitHub to help ensure the appropriate level of test cases have been implemented prior to deploying changes. Code owners are domain experts over repositories or specific areas of the code. These owners are ultimately responsible for helping to ensure tests are created and deprecated in accordance with the functional requirements.

DEPLOYMENT

To support deployment to the production environment, changes are deployed using GitHub's proprietary deployment tools and workflows. GitHub's automated deployment tool, Heaven, sits within GitHub's production environment to manage packages deployed to the production systems. To deploy any application or configuration changes, developers run a Slack chatops deployment command on the respective team channels associated with the change. This communication helps to ensure accountability and transparency within the team and other stakeholders subscribed to the channel. Furthermore, Heaven helps ensure required checks are completed, including passing of mandatory acceptance checks and ensuring the most recent Master build is used, before deploying the change to production.

MONITORING, METRICS, AND CHANGE ROLLBACK

To help ensure continued functionality, availability, and security of the Enterprise Cloud platform, comprehensive logging and monitoring tools are built into the Enterprise Cloud application, system, and network to monitor real-time telemetrics such as network traffic, successful logins and repository actions, exceptions and error messages from the application and systems, and usage statistics to detect anomalies through fine-tuned fault tolerances and historical trend analyses.

Engineering teams monitor each system component post-deployment to help ensure changes implemented did not detrimentally impact stability. A dedicated Site-Reliability Engineering team monitors and responds to incidents 24/7 through real-time, automated monitoring and incident escalation workflow. In the event of any detrimental impact to production resulting from a change, changes are rolled back to the last known stable revision of the Master version. As a matter of practice, GitHub uses branch deploys to production, so the roll-back procedure is simple and can be performed by anyone with authorization to deploy.

Once a deploy to production is shown to be faulty or unstable, based on the monitoring, manual testing, or some other measure, the assigned engineer runs a single chatops command and the main branch (Master) is deployed back to production. Depending on the severity of the findings, the engineer can make immediate changes and redeploy, or unlock deploys and begin testing again in limited environments.

To keep GitHub personnel in the loop on new feature development or other engineering efforts, the Product teams regularly host internal demos for the organization as a part of regular company and technology all-hands get togethers. These presentations are a way for technology teams to discuss and share projects implemented and goals achieved throughout the quarter.

New customer-impacting product and feature releases, defined as "notable changes", go through a standardized release process to help ensure the appropriate level of communication given the type of change. A notable change is anything added, changed, deprecated, removed, fixed, or any security fixes (CVEs) that customers should understand. These changes could affect the productivity or workflow of the user, or in the case of security fixes, require notification and awareness. For example, notable changes include API deprecations, UI improvements, or additions to payment options. These changes are communicated at several discrete stages of development and prior to launch. Methods include blog or social posts in a training-video. The online guides and user help documentation describe boundaries of the system and relevant system components to external users.

EMERGENCY DEPLOYMENTS

When an emergency or system failure means a deploy cannot follow the normal procedures, there is an established process to allow engineers to circumvent the usual tooling and force a deploy into production. The emergency deploy process, and knowing when it is justified, is a key component within GitHub culture and is well controlled.

Engineers with write access to a repository and privileges to deploy to production have the ability to force deploy. Emergency deploys are requested in the same pre-defined deploy Slack channels used for regular deploys, and the engineer requesting the deploy specifies a deploy reason to give context to the situation to observers and others who are monitoring these deploys.

After an engineer force deploys, the deploy queue is blocked for that repository until the engineer reverts the changes or merges the changes into Master. Both of these paths require CI and peer review to complete, helping to ensure the same level of visibility and testing as any other change to the code base.

When an emergency deploy is executed, an alert is posted to the #incident-command Slack channel for visibility to the on-call team. A post-mortem remediation issue is auto-created in the github/availability repository. The issue is assigned to the engineer who deployed with a post-mortem checklist the assignee completes within 24 hours, giving justification for the deploy.

Post-mortem remediation issues are reviewed weekly in the Production Engineering Availability team meeting. The deploying engineer is invited to the meeting to review the issue and the circumstances, and to verify they have completed the expected post-deploy steps to help ensure no further issues require resolution.

d) Backup and Recovery

Data in Git file and database servers is backed up in real time. These backups are encrypted as they are created. The backups from the Git file servers and database servers are maintained in geographically distinct AWS Simple Storage Solution (S3) data center locations.

The Storage Engineering team monitors the health of the Git backups. When delays in the backup jobs are encountered, the Storage Engineering team is notified. Issues requiring intervention are resolved. Common issues that cause backup job delays are documented in the Storage Engineering team's GitHub repository.

A contingency plan has been created that outlines how to recover the system in the event of disaster or other scenarios. The plan is reviewed and tested annually. Any changes identified in the review or test results are incorporated into the plan.

e) Repository History

Repositories within the application track the history of actions taken within them. Assigned users can add content to the codebase, create issues, and execute pull requests. The history of actions within a specific issue, pull request, or codebase are recorded in the repository's history.

Within an issue, the ability to edit information is restricted to the individual contributor. If an edit is made, evidence of the comment is retained in the issue history, including the name of the contributor and the date and time of the original comment and the date and time it was edited.

Edits to the code are recording in the history. Each edit includes the code changes performed, who performed the change, and the date and time the change occurred.

Pull requests can be used to share commit information with collaborators in the repository. Once submitted, pull request information cannot be edited; however, pull requests can be reverted. If reverted, the revert request links to the original pull request. The original pull request information is not altered after the revert request is sent.

When new code changes are committed to a repository, inherent Git functionality hashes the commit. github.com displays the hash value along with the commit. The hash value can be used by individuals to verify the integrity of the commit. Additionally, GitHub Enterprise Cloud allows users to add their own GPG key that can be used to digitally sign their commits.

f) Vendor Management

To initiate a vendor relationship, the Legal and Procurement teams negotiate and manage the vendor contract clauses, and additional data protection agreements with vendors who process or store GitHub data, customer data, or employee data, as well as systems that connect to GitHub systems.

The Security GRC team manages the vendor security risk assessment process. GitHub maintains operational processes to assess security risk considerations related to vendors and marketplace partners. These vendors are required to undergo an initial security risk assessment prior to contracting with GitHub. Those vendors who do not meet GitHub's baseline security requirements are not moved forward for procurement.

The Security GRC team reviews vendor security risk assessments every two years, or upon expansion or changes to the contracted service offering. Vendors deemed high risk, such as data center providers or other vendors storing or processing data in scope for GitHub's regulatory or contractual requirements, undergo reassessment annually. The assessment includes risks posed by vendors and other compliance requirements. The risks are compiled, and a report is generated outlining the risks and potential mitigation strategies. Security management reviews the report and implements risk mitigation steps.

F. Control Objectives and Related Controls

GitHub has specified the control objectives and identified the controls that are designed to achieve the related control objective. The specified control objectives and related controls are presented in Section IV, "Description of GitHub's Control Objectives and Related Controls, and Independent Service Auditor's Description of Tests of Controls and Results," and are an integral component of GitHub's Enterprise Cloud.

G. Complementary Subservice Organization Controls

GitHub's controls related to the Enterprise Cloud cover only a portion of overall internal control for each user entity of GitHub. It is not feasible for the control objectives related to the Enterprise Cloud to be achieved solely by GitHub. Therefore, each user entity's internal control over financial reporting must be evaluated in conjunction with GitHub's controls and the related tests and results described in Section IV of this report, taking into account the related complementary subservice organization controls expected to be implemented at the subservice organization as described below.

	Complementary Subservice Organization Controls	Related Control Objective	Relevant Subservice Provider(s)
1	Access to hosted systems requires strong authentication mechanisms.	**Control Objective 1:** Physical and Logical Access	AWS, Azure, Sabey, QTS, Coresite, Equinix
2	User content is segregated and made viewable only to authorized individuals.	**Control Objective 1:** Physical and Logical Access	AWS, Azure
3	Network security mechanisms restrict external access to the production environment to authorized ports and protocols	**Control Objective 1:** Physical and Logical Access	AWS, Azure, Sabey, QTS, Coresite, Equinix
4	New and existing user access and permissions to hosted systems are approved by appropriate personnel prior to be granted.	**Control Objective 1:** Physical and Logical Access	AWS, Azure, Sabey, QTS, Coresite, Equinix
5	Terminated user access permissions to hosted systems are removed in a timely manner.	**Control Objective 1:** Physical and Logical Access	AWS, Azure, Sabey, QTS, Coresite, Equinix

	Complementary Subservice Organization Controls	Related Control Objective	Relevant Subservice Provider(s)
6	User access permissions to hosted systems are reviewed by appropriate personnel on a regular basis.	**Control Objective 1:** Physical and Logical Access	AWS, Azure, Sabey, QTS, Coresite, Equinix
7	Access to the physical facilities housing hosted systems is restricted to authorized users.	**Control Objective 1:** Physical and Logical Access	AWS, Azure, Sabey, QTS, Coresite, Equinix
8	Connections to the production environment require encrypted communications.	**Control Objective 1:** Physical and Logical Access	AWS, Azure
9	Changes to hosted systems are documented, tested, and approved prior to migration to production.	**Control Objective 3:** Change Management	AWS, Azure
10	Access to make changes to hosted systems is restricted to appropriate personnel.	**Control Objective 3:** Change Management	AWS, Azure
11	Separate production and development environments are maintained.	**Control Objective 3:** Change Management	AWS, Azure

H. Complementary User Entity Controls

GitHub's controls related to the Enterprise Cloud cover only a portion of overall internal control for each user entity of GitHub. It is not feasible for the control objectives related to the Enterprise Cloud to be achieved solely by GitHub. Therefore, each user entity's internal control over financial reporting should be evaluated in conjunction with GitHub's controls and the related tests and results described in Section IV of this report, taking into account the related complementary user entity controls identified below, where applicable.

In order for user entities to rely on the controls reported on herein, each user entity must evaluate its own internal control to determine whether the identified complementary user entity controls have been implemented and are operating effectively. Users are responsible for the following:

	Complementary User Entity Controls	Related Control Objective
1	Creating and managing their Organization and Teams, including the proper configuration of access permissions to repositories.	**Control Objective 1:** Physical and Logical Access
2	Inviting, removing, and managing users in their Organization and Teams, including granting of permission levels and access to repositories, and periodic review of Organization users and outside collaborators.	**Control Objective 1:** Physical and Logical Access

	Complementary User Entity Controls	Related Control Objective
3	Ensuring authorized users are appointed as Organization owners for administration of the Organization.	**Control Objective 1:** Physical and Logical Access
4	Enabling SAML for their Enterprise Cloud accounts.	**Control Objective 1:** Physical and Logical Access
5	Enabling two-factor authentication and ensuring that members and collaborators require two-factor authentication.	**Control Objective 1:** Physical and Logical Access
6	Maintaining an effective onboarding and offboarding process for their own employees and contractors.	**Control Objective 1:** Physical and Logical Access
7	Administering and configuring repositories, including permissions, requiring reviews for pull requests, and enabling required status checks before merging.	**Control Objective 1:** Physical and Logical Access
8	Performing audits of events in the security logs.	**Control Objective 5:** Repository History
9	Configuring their repositories to utilize GitHub commit signing.	**Control Objective 5:** Repository History
10	Providing their own GPG keys for commit signing.	**Control Objective 5:** Repository History

IV. Description of GitHub's Control Objectives and Related Controls, and Independent Service Auditor's Description of Tests of Controls and Results

A. Information Provided by the Independent Service Auditor

This integrated SOC 1 Type 2 report was prepared in accordance with the AICPA attestation standards and in accordance with the International Standard on Assurance Engagements 3402, *Assurance Reports on Controls at a Service Organization*, issued by the International Auditing and Assurance Standards Board, and when combined with an understanding of the controls at user entities, is intended to assist auditors in planning the audit of user entities' financial statements or user entities' internal control over financial reporting and in assessing control risk for assertions in user entities' financial statements that may be affected by controls at GitHub.

Our examination was limited to the control objectives and related controls specified by GitHub in Sections III and IV of the report, and did not extend to controls in effect at user entities.

It is the responsibility of each user entity and its independent auditor to evaluate this information in conjunction with the evaluation of internal control over financial reporting at the user entity in order to assess total internal control. If internal control is not effective at user entities, GitHub's controls may not compensate for such weaknesses.

GitHub's internal control represents the collective effect of various factors on establishing or enhancing the effectiveness of the controls specified by GitHub. In planning the nature, timing, and extent of our testing of the controls to achieve the control objectives specified by GitHub, we considered aspects of GitHub's control environment, risk assessment process, monitoring activities, and information and communications.

The following table clarifies certain terms used in this section to describe the nature of the tests performed:

Test Procedure		Description
Inquiries	➤	Inquiry of appropriate personnel and corroboration with management.
Observation	➤	Observation of the application, performance or existence of the control.
Inspection	➤	Inspection of documents and reports indicating performance of the control.
Reperformance	➤	Reperformance of the control.

In addition, we evaluated whether the information was sufficiently reliable for our purposes by obtaining evidence about the accuracy and completeness of such information and evaluating whether the information was sufficiently precise and detailed for our purposes.

B. Test of Controls and Results

1. Physical and Logical Access

Controls Specified by GitHub	Tests Performed by Moss Adams LLP	Test Results
Control Objective 1: Controls provide reasonable assurance that physical and logical access to systems and customer data is controlled and limited to properly authorized users.		
1. Remote access to internal administration tools is restricted through unique account IDs, passwords, and a one-time token.	Inquired of the Security Operations Manager to confirm remote access to internal administration tools was restricted through unique account IDs, passwords, and a one-time token.	No exceptions noted.
	Observed the Security Operations Manager authenticate to a sample of the internal administration tools to determine whether these administration tools were restricted through unique account IDs, passwords, and a one-time token.	No exceptions noted.
	Inspected the production user access listing, the VPN authentication configuration, and the bastion host 2FA configuration to determine whether remote access to internal administration tools required unique account IDs, passwords, and a one-time token.	No exceptions noted.
2. Remote access to Enterprise Cloud production systems is restricted through VPN or bastion hosts, which require two-factor authentication.	Inquired of the Security Operations Manager to confirm remote access to Enterprise Cloud production systems was restricted through VPN or bastion hosts, which required 2FA.	No exceptions noted.
	Inspected the authentication configuration to determine whether remote access to Enterprise Cloud production systems was restricted through VPN or bastion hosts, which required 2FA.	No exceptions noted.
	Observed the Security Operations Manager authenticate to Enterprise Cloud production systems to determine whether either a VPN or bastion host connection was required.	No exceptions noted.
	Observed the Security Operations Manager connect over the VPN and the bastion host to determine whether the VPN and bastion host required 2FA.	No exceptions noted.

Controls Specified by GitHub	Tests Performed by Moss Adams LLP	Test Results
Control Objective 1: Controls provide reasonable assurance that physical and logical access to systems and customer data is controlled and limited to properly authorized users.		
3. Server and database administrative privileges are restricted to the respective system owners.	Inquired of the Data Infrastructure Engineer to confirm server and database administrative privileges were restricted to the respective system owners. Inspected access listings for servers and databases and HR records to determine whether server and database administrative privileges were restricted to the respective system owners.	No exceptions noted. No exceptions noted.
4. GitHub policy prohibits the use of shared administrative accounts for Enterprise Cloud production systems. Exceptions to the policy are documented in the Exceptions repository.	Inquired of the Security Operations Manager to confirm GitHub policy prohibited the use of shared administrative accounts for Enterprise Cloud production systems; and exceptions to this policy were documented in the exceptions repository. Inspected the Hubber Handbook to determine whether GitHub prohibited the use of shared administrative accounts for Enterprise Cloud production systems. Inspected the user access listing to Enterprise Cloud production systems to determine whether GitHub identified shared administrative accounts for Enterprise Cloud production systems. Inspected account user lists and the exceptions repository to determine whether shared account exceptions were documented.	No exceptions noted. No exceptions noted. No exceptions noted. No exceptions noted.
5. A unique account and password are required to authenticate customers to their organization in Enterprise Cloud.	Inquired of the Engineering Manager to confirm a unique account and password were required to authenticate customers to their organization in Enterprise Cloud. Inspected the authentication code configuration to determine whether a unique account and password were required to authenticate customers to their organization in Enterprise Cloud.	No exceptions noted. No exceptions noted.

Controls Specified by GitHub	Tests Performed by Moss Adams LLP	Test Results
Control Objective 1: Controls provide reasonable assurance that physical and logical access to systems and customer data is controlled and limited to properly authorized users.		
6. Users are only able to access their personal repositories and the repositories where they are granted access.	Inquired of the Engineering Manager to confirm users were only able to access their personal repositories and the repositories where they were granted access. Inspected the GitHub.com repository configuration to determine whether user access was limited to a user's personal repositories and repositories where they were granted access. Observed the repository access restrictions in the system to determine whether a test user was properly restricted from accessing a test repository where the user did not have access.	No exceptions noted. No exceptions noted. No exceptions noted.
7. GitHub uses SSH to authenticate to back-end production resources through a bastion host.	Inquired of the Site Reliability Engineer to confirm GitHub used SSH to authenticate to back-end production resources through a bastion host. Inspected the authentication configuration to determine whether GitHub uses SSH to authenticate to back-end production resources through a bastion host. Observed a user authenticate to back-end production resources to determine whether SSH was required for the user to authenticate.	No exceptions noted. No exceptions noted. No exceptions noted.
8. VPN and bastion hosts are configured to require user connections to reauthenticate after 24 hours of inactivity.	Inquired of the Security Operations Manager to confirm VPN and bastion hosts were configured to require user connections to reauthenticate after 24 hours of inactivity. Inspected the VPN and bastion hosts inactivity configuration to determine whether VPN and bastion host user connections were required to reauthenticate after 24 hours of inactivity.	No exceptions noted. No exceptions noted.

Controls Specified by GitHub	Tests Performed by Moss Adams LLP	Test Results
Control Objective 1: Controls provide reasonable assurance that physical and logical access to systems and customer data is controlled and limited to properly authorized users.		
9. GitHub's internal systems are configured to automatically provision logical and physical access based on the user's job role. GitHub's internal systems are configured to automatically provision non role-based entitlements only after the user's manager reviews and approves the access request.	Inquired of the Security Operations Manager to confirm GitHub's internal systems were configured to automatically provision logical and physical access based on the user's job role.	No exceptions noted.
	Inquired of the Security Operations Manager to confirm GitHub's internal systems were configured to automatically provision non role-based entitlements only after the user's manager reviewed and approved the access request.	No exceptions noted.
	Inspected the system configurations for the role-based entitlements to determine whether GitHub's internal systems were configured to automatically provision logical and physical access based on the user's job role.	No exceptions noted.
	Inspected the system configurations for the non-role-based entitlements to determine whether GitHub's internal systems were configured to automatically provision logical and physical access only after the user's manager reviewed and approved the access request.	No exceptions noted.
	Inspected a pull request for a sample user who received role-based entitlements to determine whether these user entitlements were granted to this user based on the user's role.	No exceptions noted.
	Inspected a pull request for a sample user who received non role-based entitlements to determine whether these user entitlements were granted only after the user's manager reviewed and approved the access request.	No exceptions noted.
	Inspected the entitlements repository revision history and the change population to determine whether these configurations were in place throughout the audit period.	No exceptions noted.

Controls Specified by GitHub	Tests Performed by Moss Adams LLP	Test Results
Control Objective 1: Controls provide reasonable assurance that physical and logical access to systems and customer data is controlled and limited to properly authorized users.		
10. The Security Operations team revokes logical production access and Production Engineering revokes physical production access for terminated personnel (employee and contractors) within 24 hours of termination.	Inquired of the Security Operations Manager to confirm the Security Operations team revoked logical production access and Production Engineering revoked physical production access for terminated personnel (employee and contractors) within 24 hours of termination.	No exceptions noted.
	Inspected termination checklists for a sample of terminated personnel to determine whether Security Operations documented the revocation of production access and Production Engineering documented the revocation of physical access for these personnel within 24 hours of their termination.	8 of 40 users sampled were not revoked within 24 hours of termination. See Section V - Other Information Provided by GitHub That Is Not Covered by the Service Auditor's Report for management's response to the noted exceptions.
	Inspected the production user access levels and physical access levels for a sample of terminated users to determine whether their physical and logical access to production systems was revoked.	No exceptions noted.
11. Semi-annually, the Security Operations team reviews and reauthorizes elevated access permissions to confirm users with this access are restricted based on the principle of least privilege.	Inquired of the Director, Security GRC to confirm the Security Operations team reviewed elevated access permissions semi-annually to confirm users with this access were restricted based on the principle of least privilege; and the access reviewed was reauthorized at the end of the review.	No exceptions noted.
	Inspected review documentation from both semi-annual security reviews performed during the period to determine whether the Security Operations team reviewed and reauthorized elevated access permissions.	No exceptions noted.

Controls Specified by GitHub	Tests Performed by Moss Adams LLP	Test Results
Control Objective 1: Controls provide reasonable assurance that physical and logical access to systems and customer data is controlled and limited to properly authorized users.		
12. The Production Engineering team reviews physical access to production data centers on an annual basis; any unapproved accounts are removed.	Inquired of the Director, Security GRC to confirm the Production Engineering team reviewed physical access to production data centers on an annual basis; and any unapproved accounts were removed.	No exceptions noted.
	Inspected physical access review documentation to determine whether the Production Engineering team reviewed physical access to production data centers during the examination period.	No exceptions noted.
	Inspected physical access lists and physical access review documentation to determine whether unapproved accounts were removed.	No exceptions noted.

2. Information Security

Controls Specified by GitHub	Tests Performed by Moss Adams LLP	Test Results
Control Objective 2: Controls provide reasonable assurance that confidentiality and information security practices protect the production environment.		
1. GitHub maintains and communicates key security standards and procedures on the GitHub intranet that address the security of systems, facilities, data, personnel, and processes.	Inquired of the Director, Security GRC to confirm GitHub maintained and communicated key security standards and procedures on the GitHub intranet; and these standards and procedures addressed the security of systems, facilities, data, personnel, and processes.	No exceptions noted.
	Inspected the GitHub intranet permissions to determine whether key security standards and procedures were made available and communicated to employees.	No exceptions noted.
	Inspected key security standards and procedures on the GitHub intranet to determine whether GitHub maintained these security standards and procedures that addressed the security of systems, facilities, data, personnel, and processes.	No exceptions noted.
2. Security Operations scans internal and external systems monthly. Security Operations reviews identified observations, shares confirmed threats with responsible stakeholders, and tracks these issues to resolution.	Inquired of the Manager, Security Operations to confirm Security Operations scanned internal and external systems monthly, reviewed identified observations, and shared confirmed threats with responsible stakeholders.	No exceptions noted.
	Inspected the vulnerability scanning configuration to determine whether internal and external security vulnerability scanning was configured to execute on a monthly basis.	No exceptions noted.
	Inspected ticketing system documentation for a sample of identified vulnerabilities to determine whether Security Operations reviewed these observations and shared confirmed threats with responsible stakeholders.	No exceptions noted.

Controls Specified by GitHub	Tests Performed by Moss Adams LLP	Test Results
Control Objective 2: Controls provide reasonable assurance that confidentiality and information security practices protect the production environment.		
3. System owners remediate vulnerabilities in accordance with established SLAs based on the severity of the vulnerabilities. Vulnerabilities that cannot be remediated within the required SLA are handled via the documented exception process.	Inquired of the Manager, Security Operations to confirm system owners remediated vulnerabilities in accordance with established SLAs based on the severity of the vulnerabilities; and vulnerabilities that could not be remediated within the required SLA were handled via the documented exception process. Inspected the Vulnerability Management Process Procedure to determine whether system owners were required to remediate vulnerabilities in accordance with established SLAs based on the severity of the vulnerabilities; and whether vulnerabilities that could not be remediated within the required SLA were handled via the documented exception process. Inspected tickets for a sample of vulnerabilities to determine whether these vulnerabilities were remediated within SLA or were handled via the documented exception process; and whether these remediated vulnerabilities were completed in accordance with established SLAs based on the severity of the vulnerabilities.	No exceptions noted. No exceptions noted. No exceptions noted.
4. GitHub operates a bug bounty program. The on-call security resource monitors the submissions and triages accordingly. If a bug is deemed to be legitimate, Security informs the relevant engineers and the bug is tracked in GitHub issues to resolution.	Inquired of the Security Engineering Senior Manager to confirm GitHub operated a bug bounty program; on-call security resources monitored the submissions and triaged accordingly; and for legitimate bugs, Security informed the relevant engineers and the bug was tracked in GitHub issues to resolution. Inspected the bug bounty platform to determine whether researchers were able to report bugs. Inspected tracking tickets for a sample of bugs in the bug tracking repository to determine whether these bugs were triaged and tracked to resolution.	No exceptions noted. No exceptions noted. No exceptions noted.

Controls Specified by GitHub	Tests Performed by Moss Adams LLP	Test Results
Control Objective 2: Controls provide reasonable assurance that confidentiality and information security practices protect the production environment.		
5. The Security GRC team assesses internal security controls through sample-based testing to ensure that control design and operation continues to meet defined criteria and system requirements.	Inquired of the Director, Security GRC to confirm the Security GRC team assessed internal security controls annually through sample-based testing to help ensure control design and operation continued to meet defined criteria and system requirements. Inspected internal control test results to determine whether the Security GRC team assessed internal security controls during the examination period through sample-based testing to help ensure control design and operation continued to meet defined criteria and system requirements.	No exceptions noted. No exceptions noted.
6. GitHub has defined hardening standards based on its security hardening practices. The Security Operations team reviews and approves changes to the standard hardening procedures.	Inquired of the Director, Security GRC to confirm GitHub had defined hardening standards based on GitHub security hardening practices; and the Security Operations team reviewed and approved changes to the standard hardening procedures. Inspected standard hardening procedures to determine whether GitHub had defined hardening standards based on its security hardening practices. Inspected revision history approval documentation for a sample of changes to standard hardening procedures to determine whether the Security Operations team reviewed and approved these changes to the standard hardening procedures.	No exceptions noted. No exceptions noted. No exceptions noted.
7. Network firewalls restrict external points of connectivity and prevent unauthorized traffic from beyond the system boundary.	Inquired of the Site Reliability Engineer to confirm network firewalls restricted external points of connectivity and prevented unauthorized traffic from beyond the system boundary. Inspected firewall configurations to determine whether they restricted external points of connectivity, and whether they were configured to prevent unauthorized traffic from beyond the system boundary.	No exceptions noted. No exceptions noted.

Controls Specified by GitHub	Tests Performed by Moss Adams LLP	Test Results
Control Objective 2: Controls provide reasonable assurance that confidentiality and information security practices protect the production environment.		
8. GitHub Support receives reports of security issues from customers via emails or through the web form. A ticketing system is used to document and track these issues to resolution.	Inquired of the Security Incident Response Team (SIRT) Manager to confirm GitHub Support received reports of security issues from customers via emails or through the web form; and a ticketing system was used to document and track these issues to resolution.	No exceptions noted.
	Inspected the customer support communication channels to determine whether security events from customer emails or web requests were available and recorded.	No exceptions noted.
	Inspected tickets for a sample of issues to determine whether these issues were documented and tracked to resolution.	No exceptions noted.
9. A third party performs an annual application penetration assessment. Security Operations triages and tracks identified issues through to resolution.	Inquired of the Director of Application Security Engineering to confirm a third party performed an annual application penetration assessment; and Security Operations triaged and tracked identified issues through to resolution.	No exceptions noted.
	Inspected the penetration test report to determine whether a third party performed an application penetration assessment during the examination period.	No exceptions noted.
	Inspected the penetration test report and tracking documentation to determine whether Security Operations triaged and tracked identified issues through to resolution.	No exceptions noted.

3. Software Change Management

Controls Specified by GitHub	Tests Performed by Moss Adams LLP	Test Results
Control Objective 3: Controls provide reasonable assurance that the development of new application functionality and software changes is documented, authorized, tested, and approved before being implemented in the production environment.		
1. Test environments are logically separated from production environments.	Inquired of the Technical Project Manager to confirm test environments were logically separated from production environments. Inspected the configuration of production and test environment clusters to determine whether these environments were logically separated.	No exceptions noted. No exceptions noted.
2. GitHub engineering code owners create and execute automated regression test cases to address functionality and security requirements.	Inquired of the Technical Project Manager to confirm GitHub engineering code owners created and executed automated regression test cases to address functionality and security requirements. Inspected the automated regression test cases for a sample of code changes to determine whether GitHub engineering code owners created and executed test cases to address functionality and security requirements for these changes.	No exceptions noted. No exceptions noted.
3. A security code analysis tool scans code during commits and merges. The scanning tool posts potential vulnerabilities on the change pull request. The developer assesses the potential vulnerabilities and a peer reviewer follows up on the items during change review and approval.	Inquired of the Director, Application Security Engineering to confirm a security code analysis tool scanned code during commits and merges, the scanning tool posted potential vulnerabilities on the change pull request, the developer assessed the potential vulnerabilities, and a peer reviewer followed up on the items during change review and approval. Inspected automated code security analysis results for a sample of code changes to determine whether an automated code security analysis was performed for these changes during commits and merges. Inspected pull requests for a sample of code changes to determine whether potential vulnerabilities noted for these changes were posted on the change pull request, the developer assessed the potential vulnerabilities, and a peer reviewer followed up on these items during change review and approval.	No exceptions noted. No exceptions noted. No exceptions noted.

Controls Specified by GitHub	Tests Performed by Moss Adams LLP	Test Results
Control Objective 3: Controls provide reasonable assurance that the development of new application functionality and software changes is documented, authorized, tested, and approved before being implemented in the production environment.		
4. Application changes pass automated continuous integration testing prior to deployment to the production environment.	Inquired of the Technical Project Manager to confirm application changes passed automated continuous integration testing prior to deployment to the production environment. Inspected pull request documentation for a sample of changes to determine whether these application changes passed automated continuous integration testing prior to deployment to the production environment.	No exceptions noted. No exceptions noted.
5. An independent reviewer evaluates and approves system change requests via a GitHub pull request.	Inquired of the Director, Software Engineering to confirm an independent reviewer evaluated and approved system change requests via a GitHub pull request. Observed and inspected the pull request documentation for a sample of code changes to determine whether an independent reviewer evaluated and approved these changes.	No exceptions noted. No exceptions noted.
6. Branch protection system configurations enforce peer reviews and integration tests prior to the deployment of changes to the production environment and alert code owners of any forced deployments.	Inquired of the Technical Project Manager to confirm branch protection system configurations enforced peer reviews and integration tests prior to the deployment of changes to the production environment and alerted code owners of any forced deployments. Inspected branch protection system configurations for the github and puppet repositories to determine whether system configurations enforced peer reviews and integration tests for these repositories prior to the deployment of changes to the production environment and alerted code owners of any forced deployments. Inspected tickets for a sample of code deployments to the production environment to determine whether peer reviews and integration tests were completed prior to the deployment of these changes to the production environment. Inspected an alert for a sample forced deployment to determine whether the assigned code owner was alerted of the forced deployment.	No exceptions noted. No exceptions noted. No exceptions noted. No exceptions noted.

Controls Specified by GitHub	Tests Performed by Moss Adams LLP	Test Results
Control Objective 3: Controls provide reasonable assurance that the development of new application functionality and software changes is documented, authorized, tested, and approved before being implemented in the production environment.		
7. The Product Engineering team monitors emergency deploys on a real-time basis, and post-mortem reviews are performed for emergency changes impacting production systems.	Inquired of the Technical Project Manager to confirm emergency deploys were monitored on a real-time basis, and post-mortem reviews were performed for emergency changes that impacted production systems.	No exceptions noted.
	Inspected the Software Development Lifecycle Policy to determine whether this policy defined requirements for real-time emergency deploy monitoring, and post-mortem reviews for emergency changes impacting production systems.	No exceptions noted.
	Inspected deploy monitoring tools to determine whether the Product Engineering team monitored emergency deploys on a real-time basis.	No exceptions noted.
	Inspected the post-mortem reviews for a sample of emergency code changes to determine whether a post-mortem review was performed for these changes.	No exceptions noted.
8. Code commits, whether direct commits or through a pull request, are hashed. The hash is displayed with the commit to facilitate code integrity verification.	Inquired of the Director, Security GRC to confirm code commits, whether direct commits or through a pull request, were hashed; and the hash was displayed with the commit to facilitate code integrity verification.	No exceptions noted.
	Observed the submission of a test direct code commit and a test pull request to determine whether these test commits were hashed.	No exceptions noted.
	Inspected test commits for a sample of changes to determine whether the hash was visible with these commits.	No exceptions noted.

4. Backup and Recovery

Controls Specified by GitHub	Tests Performed by Moss Adams LLP	Test Results
Control Objective 4: Controls provide reasonable assurance that system data is regularly backed up and archived data is available for restoration in the event unexpected interruptions occur.		
1. Backups of customer Git repositories are performed on a real-time basis using an automated system. Backups of customer databases are encrypted during creation.	Inquired of the Senior Software Engineer to confirm customer Git repositories were backed up in real time using an automated system; and backups of customer databases were encrypted during creation.	No exceptions noted.
	Inspected the backup configuration to determine whether customer Git repositories were configured to be backed up on a real-time basis using an automated system.	No exceptions noted.
	Inspected the backup configuration to determine whether customer database backups were configured to be automatically encrypted during the backup creation process.	No exceptions noted.
	Inspected backup storage system logs to determine whether backups were created throughout the period.	No exceptions noted.
2. The Storage Engineering team tests GitHub's backup restoration process annually.	Inquired of the Storage Engineering team manager to confirm the Storage Engineering team tested GitHub's backup restoration process annually.	No exceptions noted.
	Inspected GitHub backup restoration plans to determine whether backup restoration procedures were documented.	No exceptions noted.
	Inspected documentation of the most recent backup restoration to determine whether GitHub's defined Git and database data restoration plans were tested during the past year.	No exceptions noted.

5. Repository History

Controls Specified by GitHub	Tests Performed by Moss Adams LLP	Test Results
Control Objective 5: Controls provide reasonable assurance that repository history is complete and accurate.		
1. GitHub.com issue information is editable by individual contributors. Evidence that a comment was made is retained in the issue history, including the name of the contributor, the date and time of the original comment, and the date and time it was edited.	Inquired of the Director, Security GRC to confirm GitHub.com issue information was editable by individual contributors; and evidence that a comment was made was retained in the issue history, including the name of the contributor, the date and time of the original comment, and the date and time it was edited.	No exceptions noted.
	Inspected a GitHub repository functionality to determine whether the ability to edit issue information was limited to individuals with access to the repository.	No exceptions noted.
	Inspected the history after observing the editing of a test GitHub issue to determine whether edit information was recorded, including the name of the contributor, the date and time of the original comment, and the date and time this issue was edited.	No exceptions noted.
2. Pull requests cannot be edited once they are submitted, but they can be reverted. The revert request links to the original pull request.	Inquired of the Director, Security GRC to confirm pull requests could not be edited once they were submitted, but they could be reverted; and the revert request linked to the original pull request.	No exceptions noted.
	Observed the submission of a pull request to a test repository and attempted to edit this pull request to determine whether this pull request could not be edited after submission.	No exceptions noted.
	Observed the reverting of a test pull request to determine whether this revert request linked to the original test pull request.	No exceptions noted.

Controls Specified by GitHub	Tests Performed by Moss Adams LLP	Test Results
Control Objective 5: Controls provide reasonable assurance that repository history is complete and accurate.		
3. GitHub.com retains a history of actions taken with directly edited code files, including the code changes made, who made the change, and the date and time of the change.	Inquired of Director, Security GRC to confirm github.com retained a history of actions taken with directly edited code files, including the code changes made, who made the change, and the date and time of the change.	No exceptions noted.
	Observed the edit of test code files in a GitHub codebase to determine whether the edits to these test files were recorded in the codebase history.	No exceptions noted.
	Inspected the edit history to determine whether it included the code change made, the name of the individual that made these test changes, and the date and time of the change.	No exceptions noted.
4. Code commits, whether direct commits or through a pull request, are hashed. The hash is displayed with the commit to facilitate code integrity verification.	Inquired of the Director, Security GRC to confirm code commits, whether direct commits or through a pull request, were hashed; and the hash was displayed with the commit to facilitate code integrity verification.	No exceptions noted.
	Observed the submission of a test direct code commit and a test pull request to determine whether these test commits were hashed.	No exceptions noted.
	Inspected test commits for a sample of changes to determine whether the hash was visible with these commits.	No exceptions noted.

6. Vendor Management

Controls Specified by GitHub	Tests Performed by Moss Adams LLP	Test Results
Control Objective 6: Controls provide reasonable assurance that vendors are assessed for their ability to meet security compliance requirements.		
1. Prior to engaging a new vendor, GitHub reviews vendor security compliance and documents the results in the vendor security repo. On an annual basis, GitHub assesses the controls implemented at subservice organizations who receive or store customer data through the review of relevant subservice organizations' attestation reports.	Inquired of the Director, Security GRC to confirm GitHub reviewed vendor security compliance prior to engagement a new vendor and documented the results in the vendor security repo; and GitHub assessed the controls implemented at subservice organizations that received or stored customer data on an annual basis through the review of relevant subservice organization attestations' reports.	No exceptions noted.
	Inspected the vendor security compliance review documentation for a sample of new vendors to determine whether GitHub reviewed vendor security compliance for these vendors prior to engagement.	No exceptions noted.
	Inspected the control assessments for a sample of subservice providers that received or stored customer data to determine whether GitHub assessed subservice organization controls during the examination period through the review of these subservice organizations' attestation reports.	No exceptions noted.

V. Other Information Provided by GitHub That Is Not Covered by the Service Auditor's Report

A. Management's Response to Identified Testing Exceptions

Control #	Controls Specified by GitHub	Exception Noted by Moss Adams LLP	GitHub Management Response
1.10	The Security Operations team revokes logical production access and Production Engineering revokes physical production access for terminated personnel (employee and contractors) within 24 hours of termination.	8 of 40 users sampled were not revoked within 24 hours of termination.	GitHub's employee (including contractors) termination process is comprised of two main sub-processes: (1) HR's process to identify an employee/contractor's date of termination and configure that date manually within GitHub's HRIS; (2) SecOps's automated process to receive the notice of termination (systematically identified upon input of the termination date to the HRIS) and automatically (via system configuration and automation) remove access to GitHub's internal systems. With regard to the control deviation noted by the Service Auditor, the manual sub-process discussed above was delayed as a result of unplanned changes to the users' project timeline and employment. As soon as IT was able to confirm the details of the terminations, the revised termination dates were input/updated within the HRIS and the automated sub-process executed without delay or exception. Additionally, upon further inspection of each user's internal system access and account activity, GitHub Management determined no inappropriate actions were taken by any employee during the period as a result of the deviation noted by the Service Auditor.

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