

Qlik Sense® Enterprise SaaS

Key feature of Qlik Cloud Analytics

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Qlik Sense Overview

Qlik Sense sets the benchmark for third-generation analytics platforms, empowering everyone in your organization to make data-driven decisions. Built on our unique Associative Engine, it supports a full range of users and use-cases across the lifecycle from data to insight: self-service analytics, interactive dashboards, conversational analytics, custom and embedded analytics, mobile analytics, reporting and alerting. It augments and enhances human intuition with AI-powered insight suggestions, automation, and natural language interaction. And Qlik Sense offers unmatched performance and governance, with the convenience of SaaS or on-premises deployment.

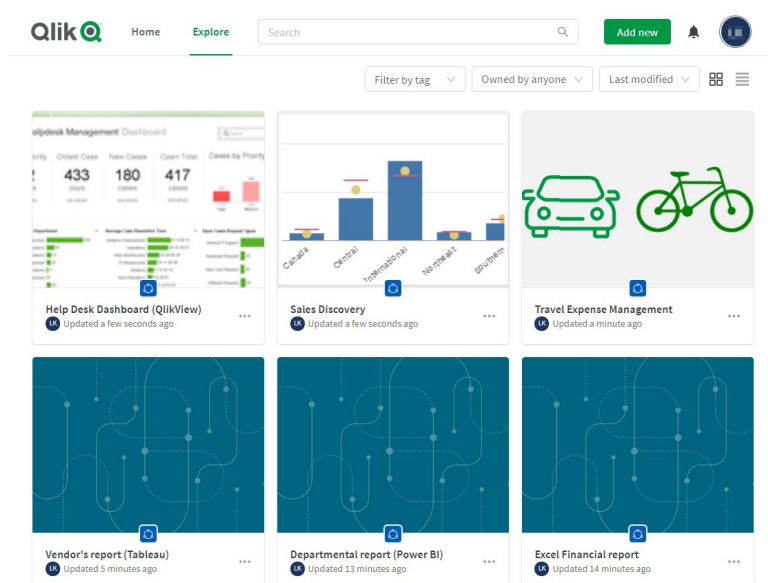
Qlik Sense consists of Qlik-managed cloud-based solutions: *Qlik Sense Enterprise SaaS* & *Qlik Sense Business*, and a customer-managed solution: *Qlik Sense Enterprise Client-Managed*. The focus of this document is Qlik Sense Enterprise SaaS.

Qlik Sense Enterprise SaaS Overview

As part of Qlik's cloud first strategy we have developed our own cloud platform, Qlik Cloud, on which we manage cloud editions of our product portfolio to deliver them to customers and partners as software-as-a-service (SaaS) offerings. Qlik Sense Enterprise SaaS is our premium cloud solution and provides businesses world-class analytics without the complexities of installing and managing their own deployment.

A single platform for analytics

The microservice-based architecture behind Qlik Sense Enterprise SaaS allows us to host both Qlik Sense and QlikView® applications (apps) in a customer's Qlik Sense Enterprise SaaS tenant. This means users have a single location to open and consume their Qlik apps. In addition to hosting Qlik apps, Qlik Sense Enterprise SaaS provides the ability to add links to other types of reports and assets such as documentation, providing a single portal for your users to consume all your analytics and reporting assets.



Associative, in-memory apps

Qlik couples in-memory data storage technology with an Associative Engine that lets you analyze and freely navigate data intuitively. In its second generation, the proven Qlik Associative Engine allows users to easily explore data and create visualizations based on data from multiple data sources simultaneously. These sources range from Excel® and Access® to databases such as Oracle® and SQL Server to big data sources such as Cloudera® and Redshift®.

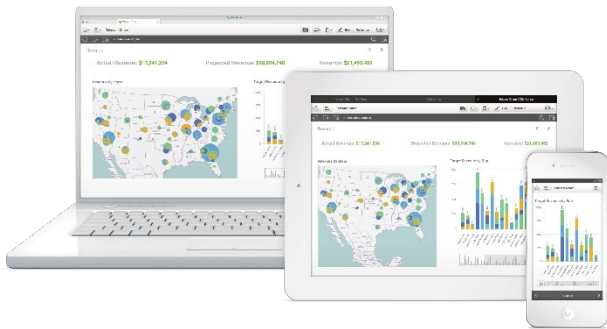
Qlik Sense uses columnar, in-memory storage. Unique entries are only stored once in-memory, and

relationships among data elements are represented as pointers. This allows for significant data compression, more data in RAM, and faster response times for your users.

In some big data scenarios, data should remain at the source, which is why Qlik uses a built-in technique called On-Demand Application Generation. Data sources can be queried based on your users' selections, yet still provide an associative experience to your user. Qlik's Dynamic Views feature expands this capability further for the biggest data sources available.

User Interfaces

Access to the Qlik Sense Enterprise SaaS environment is through a zero-footprint web browser interface (known as the Qlik Sense Hub). The Qlik Sense web browser interface makes all aspects of development, drag-and-drop content creation, and consumption possible. Qlik Sense features a responsive design methodology to automatically display and resize visualizations with the appropriate layout and information to fit the device — whether it is a browser on a laptop or desktop, tablet, or smartphone. Built with current standards of HTML5, CSS3, JavaScript®, and web sockets, Qlik Sense enables you to build and consume apps on any device.



In addition to the web-based interface, Qlik Sense supports conversational analytics which integrates with major chat platforms such as Slack and MS Teams and data alerting capabilities to allow users to subscribe to and be notified of key changes to their data.

THE ASSOCIATIVE DIFFERENCE®

Relational databases and queries were designed in the 1980s for transactional systems, not modern analytics. Query-based tools leave data behind and limit your users to restricted linear exploration, resulting in blind spots and lost opportunities.

Qlik Sense runs on the unique Qlik Associative Engine, enabling users of all skill levels to explore their data freely without limitations. The Qlik Associative Engine brings together unlimited combinations of data — both big and small — without leaving any data behind. It offers unprecedented freedom of exploration through interactive selection and search, instantly recalculating all analytics and revealing associations to your user in green (selected), white (associated), and gray (unrelated). By keeping all visualizations in context together and retaining both associated and unrelated values in the analysis, the Qlik Associative Engine helps your users discover hidden insights that query-based tools would miss.

The Qlik Associative Engine is purpose-built for highly scalable, dynamic calculation and association on massive data volumes for large numbers of users. This unique technology is our primary advantage, with more than 25 years of innovation and investment.

Direct Query Apps

While most uses-cases benefit from the power of Qlik's Associative and Cognitive engines, there are times when accessing the data in real-time is worth forgoing these benefits. There are also cases where big data scenarios necessitate push-down aggregation against massive data sets. For these use-cases Qlik has developed Direct Query.

Direct Query complements Qlik's already best-in-class analytics engine and strengthens the overall range of consumption techniques customers can leverage when analyzing data. Direct Query provides the ability for a Qlik Sense application to directly connect to a cloud database and autogenerate SQL queries as the user interacts with visualizations and easy user filtering. This is commonly called

'SQL Pushdown', the users 'pushes down' queries onto the database and different from what our analytics engine does in-memory. Direct Query uses a logical data model to understand the source data and generate SQL.

Direct Query allows real-time access to your data and offers a subset of functions available in a traditional in-memory app. Direct query is not designed to be a solution for all data access requirements and is best suited to the following use-cases:

- Data Analyst exploring new database and tables
- Simple dashboard for live KPIs, small number of users
- Prototyping dashboard in initial phases before production
- Direct Query as springboard for extracting slices of data into Qlik Analytic Engine using on-demand apps.



Direct Query currently supports Snowflake and will be expanded to other cloud data sources in the future.

Any user can develop apps

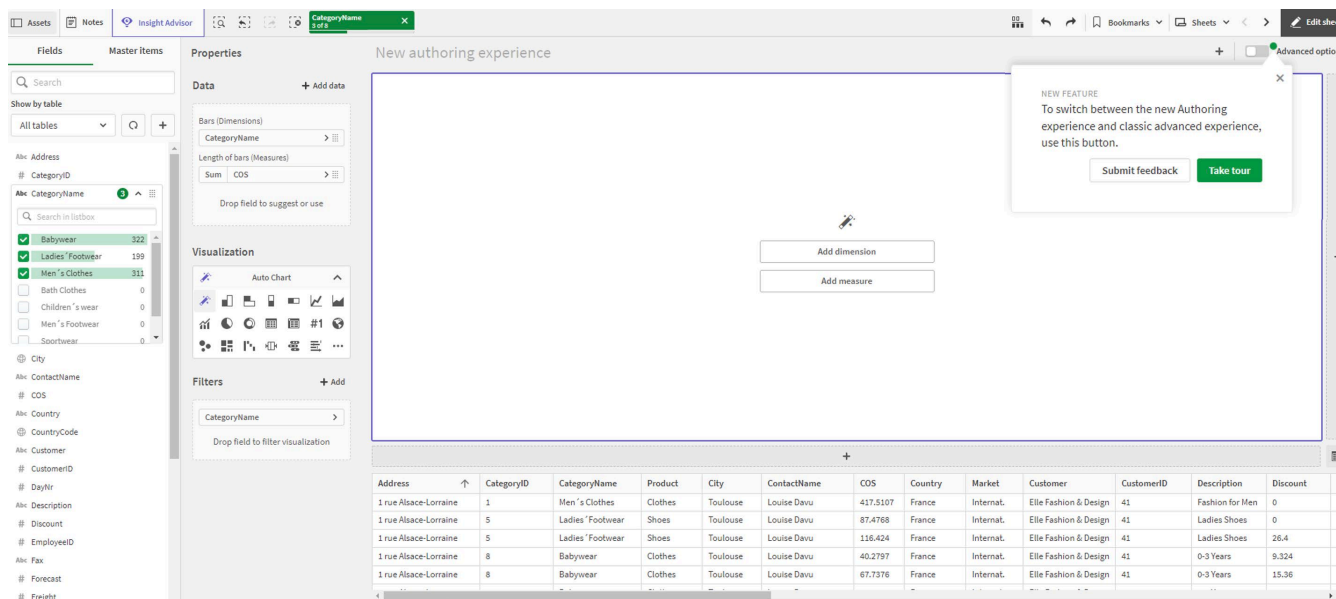
When building a new app, Qlik Sense Enterprise SaaS supports two authoring experiences depending on the user type

Simplified Authoring experience

With Simplified Authoring, we set out to improve the first-time user experience, however it also offers tremendous value for more experienced users. Enhancements are specifically targeted around creation of charts, exploring data, defining properties, and filtering. The Simplified Authoring experience provides fast access of the most common creation elements, including properties, so all components will not be visible by default. However, the Advanced Authoring experience is just a click away for those who prefer the classic look and feel or need the full set of properties.

Key features:

- Select and interact during edit
- Field list with values and histogram
- Data table front and center
- Faster with smart grid
- Auto chart and quick change
- Effortless filtering



Advanced Authoring experience

The Advanced Authoring capabilities of Qlik Sense give you greater control over your visualizations and make it easier to build guided analytics applications for faster data-driven insights. Recent authoring innovations enable you to deliver a richer analytics experience, clarify insights, and give users a deeper understanding of their data to expedite data-driven decision making. Over the past few years, Qlik has added more than 100 Advanced Authoring capabilities for Qlik Sense that make it easy to create and consume guided applications. These Advanced Authoring capabilities are designed to balance:

- The ease of use of self-service analytics with Qlik Sense
- The flexibility to address all the complex use cases your business requires
- The advanced functionality, settings, and options within charts and visualizations that power users require

Our goal has been to give self-service users the ability to do more, ensuring you have both the capability and scalability to author the apps you need.

Notifications and Alerts

Notification capabilities allow users to configure Qlik Sense Enterprise SaaS system-based events. These events include status of application reloads, and users' status in spaces. Spaces are sections in the cloud hub where users can collaborate and set controls (for more information reference the spaces section below). Users have control over their notification subscriptions, managing which channel (e-mail or web) they would like to receive them, as well as for opting to unsubscribe at any time.

Alerting capabilities allow users to configure alerts based on customer-defined business criteria relating to data in an application. Alerts are triggered to users during an application reload and can be set up to use a combination of dimensions and measures within an application. Alerts will apply the criteria solely to the data the user has permissions to access and may be delivered to the configured channel of choice (web or e-mail). All users of Qlik Sense Enterprise SaaS can create personal alerts. Users with a Professional role assignment can add other users as recipients to their alerts, provided that all recipients must have access to the application to receive the alert. Qlik Sense Enterprise SaaS allows users to track alert history. This information is protected by AES-256 encryption and securely stored within QCS.

All notifications and alerts can be configured to send through three channels:

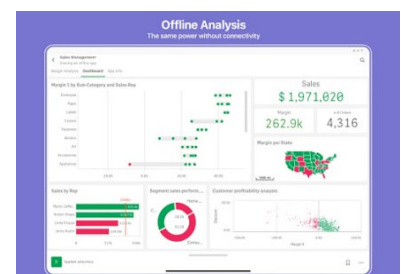
Email. Emails are sent using customer provided SMTP settings defined in the Administration Console and utilizing the Transport Layer Security (TLS) security settings from the customer's SMTP service. The same SMTP setting is shared across all features integrated with e-mail capabilities in QCS.

Web. Web notifications and alerts are delivered to the Qlik Sense web client browser over a secure HTTPS connection using TLS 1.2 AES-256 with signed digital certificates.

Qlik Sense SaaS Mobile app. Alerts can be sent directly to users of the mobile app (see below).

Access SaaS Applications where you want, how you want

Qlik Sense SaaS Mobile delivers the all the power of the Qlik Sense SaaS analytics platform on your device, whether phone or tablet. Users get an enhanced mobile user experience, offline analysis, and integrated alerting for real-time action at the point of decision. With a key technology breakthrough - our associative engine running locally on-device - Qlik Sense Mobile provides fully interactive exploration and analysis even when reliable connectivity is not guaranteed.



Advanced Analytics & Machine learning

Most organizations today have either implemented or are planning to implement some form of advanced analytics functionality as part of their analytics lifecycle. The challenge for many is that they lack sufficient (or any) data scientists; a highly specialized and in-demand skillset.

Qlik's approach to Advanced analytics therefore provides several solutions for different skill levels and needs:

- **Insight Advisor** to auto-generate advanced analyses and insights and support natural language interaction including search and conversational analytics.
- **Qlik AutoML** to provide an automated solution that makes machine learning available to regular developers.
- **Analytics Connectors** to support integration with more advanced and specialized solutions for Data Scientists.

Conversational analytics

Insight Advisor Chat is a chat-based interface for conversational analytics and lets users search for insights across any apps assigned within their hub. Insight Advisor Chat can recognize and be programmed to return insights from the most appropriate apps that contain relevant results based on the queries or metrics identified. When users select a specific app, Insight Advisor Chat provides a text response or visualization. Insight Advisor Chat may suggest further analyses for a query that create different visualizations. Users can also ask follow up queries, such as in a 'sales for a particular country' or for a particular year, and Insight Advisor Chat will provide new results.

Users can phrase search queries for facts, comparisons, and rankings. Facts are statements such as "What are my sales?" or "Show expenses over time for 2019". Users can ask for a comparison by adding "vs" or compare to a query. For example, "Compare sales to expenses over time". Users can ask for rankings by adding 'top' to a query.

For example, *"Show me top 10 product by sales for 2020"*.

Insight Advisor Chat can analyze an app to see how fields are used to create charts. The Qlik Precedents Service examines the use of data fields and master items in charts. This teaches precedents for making aggregations, dimensions, and measures for the data model of the app. In

unpublished apps, Insights can use precedents learned from published apps and from user feedback in the app.

The Qlik Sense Natural Language (NL) Query API lets users embed Augmented Analytics capabilities into their products such as integration into an existing chatbot platform. Users can use the NL Query API to query a selected app or multiple apps. The API responds with text or a visualization.

For more information on Insight Advisor see: <https://www.qlik.com/us/products/qlik-sense/ai>

Qlik AutoML

Qlik AutoML is an advanced analytics service in Qlik Cloud Data Services. Previously available as a separate cloud platform, Qlik AutoML has now been fully integrated into Qlik Cloud and is available to all enterprise customers .

Qlik AutoML can build and deploy machine learning (ML) models without writing code. It automates the process of applying machine learning to real world problems, including data preparation, feature extraction, and algorithm selection and optimization; tasks that traditionally require a data scientist. Enabling analytics teams to embrace machine learning without specialized skills will enable them to close the key gaps between data and insight, and between insight and action.

Qlik AutoML provides the ability to train models to a particular dataset across a range of structured supervised machine learning problems. Predictions are generated and include prediction explanation scores to help understand the outcome. Qlik AutoML seamlessly connects to data in the Qlik Cloud Catalog, which provides connectivity to a wide range of data sources. What if scenario modelling through Qlik Sense enables customers to understand how changes in input data are impacted by the model. Qlik AutoML exposes API endpoints that can be called to make predictions for real-time use cases.

What algorithms does Qlik AutoML use to train models?

By default, Qlik AutoML runs several different algorithms based on the Metric selected for predictions. We use algorithms contained in the open source Python library, scikit-learn. The parameters that are used are scikit-learn's default values for each algorithm.

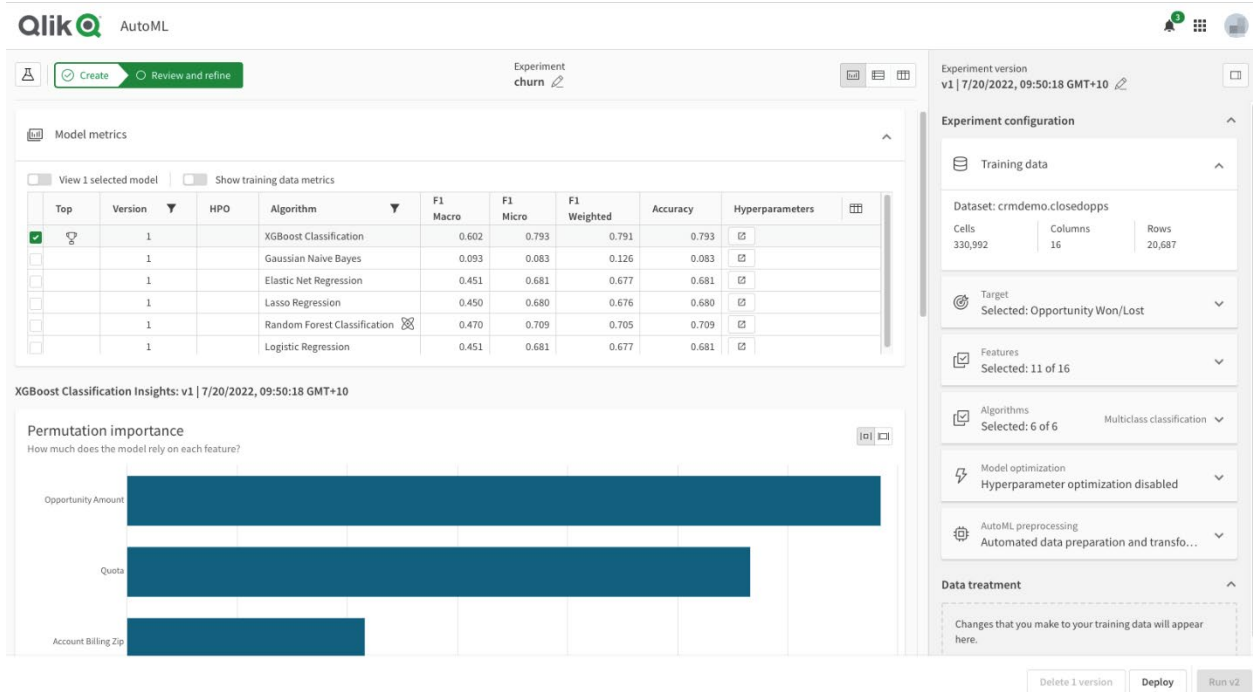
The algorithm types we support are:

- **Binary Classification Models**
- **Multi-Class Classification Models**
- **Regression Models**

See [scikit-learn](#) for more details.

Working with AutoML is a two-phase process:

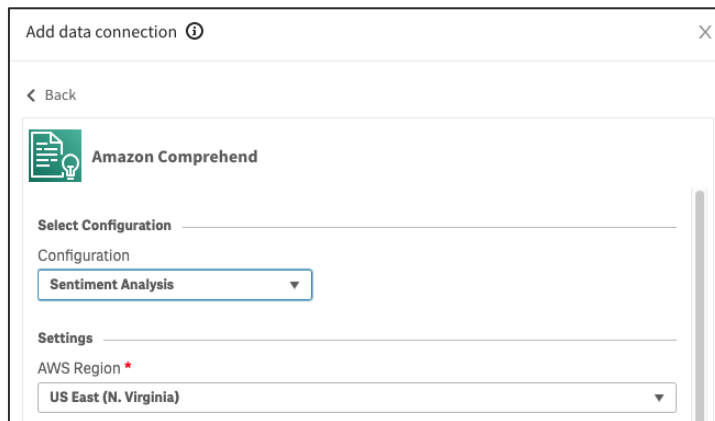
- **ML Experiment:** This is where we train the model against a set of historical data (for example closed sales opportunities) and evaluate the best algorithms for predicting future state. We can see which factors most heavily influence historical results and exclude attributes we feel should be excluded. When we are confident in our experiment we deploy this model.



- **ML Deployment:** Here we take the model we created in the experiment and use this to process the dataset we wish to make predictions on. Predictions can be made against datasets in the form of files, or in real-time by providing the data through our REST APIs. This data can in turn be used in your analytics applications.

Analytics Connectors

Customers have been able to create innovative integrations with Qlik Sense using our Advanced Analytics Integration technology for several years. Additionally, to meet customers' needs aligning with strategic platforms, Qlik offers integration to native tools kits and open-source technology such as R and Python. Most customers are aligning with a strategic platform of choice and any integration needs to be simple and supported rather than an API that allows for them to build their own.



With Advanced

Analytics Integration on Qlik Cloud, Qlik has taken the best of AAI technology and made it available on Qlik Cloud with direct connectivity to a range of third-party Machine Learning platforms such as Amazon Comprehend & SageMaker, Azure ML and DataRobot. These capabilities are paired with a new generic interface that will allow

customers to connect to a wide range of third party or custom-built REST interfaces, allowing for a more flexible integration without the need to build a complete connector for other services.

Analytic Connectors are as simple to setup as any current database connector and allow for Qlik to be paired with a customer's Machine learning platforms of choice for a wide range of innovative use cases which allow the transformational value of the data science to extend into the analytics and enable decision makers across the organization.

Analytics sources	
	Advanced Analytics
	Amazon Comprehend
	Amazon SageMaker
	Azure ML
	Databricks MLFlow
	DataRobot
	Qlik AutoML (Legacy)

Working with Qlik Sense Enterprise SaaS

Tenants, user roles & entitlements

Tenants

Each customer creates an instance of the Qlik Cloud environment, which is called a “tenant.” Qlik Sense Enterprise SaaS is a service of Qlik Cloud and therefore each Qlik Sense Enterprise SaaS customer has their own tenant.

Roles

In addition of the platform roles, there are specific roles available. There are several roles that users can have in Qlik Sense Enterprise SaaS tenants.

- **Analytics Admin** – The Analytics Admin role is a partial administrator. A user with this role has access to the Using the Management Console but only to the areas of governance and content.
- **SharedSpaceCreator** – A user with this role can create shared spaces.
- **ManagedSpaceCreator** – A user with this role can create managed spaces.

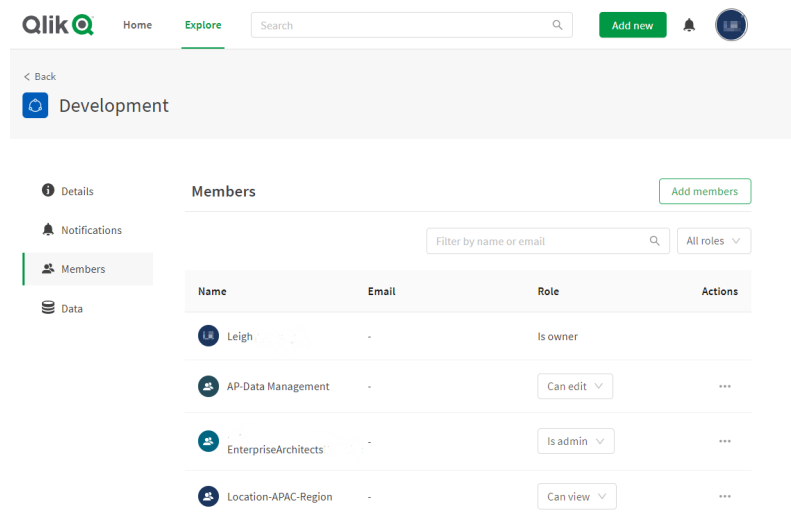
These Qlik Sense Enterprise SaaS roles work with the platform roles such as Tenant admin and the users’ entitlements such as professional & analyzer access. Roles can be assigned to groups or to individual users.

Spaces

Spaces are areas of the Qlik Sense Hub used to both develop and control access to apps, data files and data connections. There are three types of spaces in Qlik Sense Enterprise SaaS:

- **Personal spaces** - Private work areas for each user in the Qlik Sense Hub.

- **Shared spaces** - Areas used to develop apps collaboratively and share them with other users in the space. A group of users may use a shared space for the private development and consumption of their own apps.



- **Managed spaces** - Governed sections of the Qlik Sense Hub that are used for providing access to apps with strict access control both for the app and the app data.

DataFiles & Data Connections in Spaces – DataFiles and Data Connections, just like Apps, can also be stored and reused across the three space types.

Access to shared and managed spaces can be assigned either directly to users or to groups. It is considered best practice to use groups and manage group membership in the Identity Provider rather than directly assign access to individual users. Various levels of access can be assigned, so it is possible that a user can have different access permissions to different spaces.

Enterprise data at scale

Tenant resources

Each Qlik Sense Enterprise SaaS tenant provides fully expandable storage³ and with a standard Qlik Sense Enterprise subscription, each Qlik Sense app can consume up to 5 gigabytes of memory. Qlik Sense Enterprise SaaS scales to meet the demand that is required on system resources with no requirements on users to configure any of the infrastructure.

Expanded Apps and Dedicated Capacity

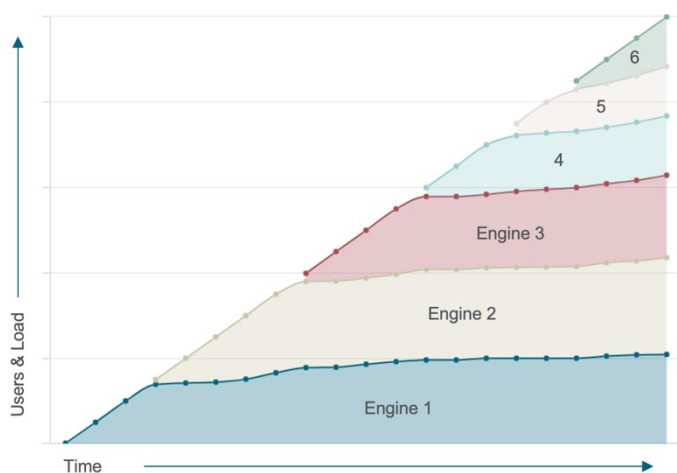
Certain use cases may require apps that use more than 5 gigabytes of memory. Qlik provides an Expanded Apps option for applications between 5 gigabytes and 10 gigabytes in memory. For apps

³ Subject to the Qlik Sense Enterprise license metrics

larger than 10GB in memory, or workloads that require even larger capacities, Qlik offers Dedicated Capacity options.

In addition, Qlik Sense Enterprise SaaS supports integration with enterprise storage solutions such as AWS s3 and Azure storage to enable access to users' own storage assets. Please see the section [Integrate on-premises Data with SaaS](#) for more details.

Automatic scaling to meet user load



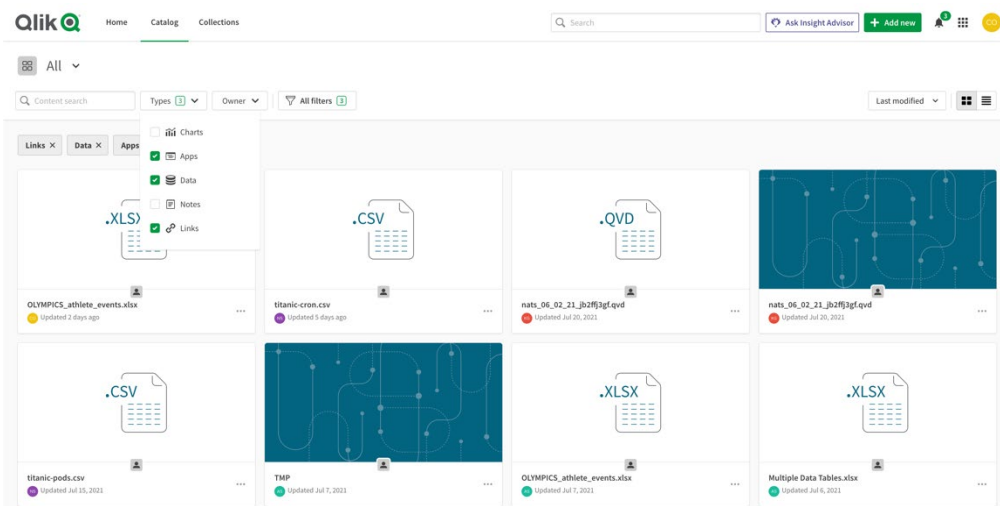
When using client managed deployments on-premises or in a public cloud, customers are required to estimate and size infrastructure for their peak usage. This is a complex process and often customers either under or over resource for peak usage times, leading to poor performance or unnecessary cost. Often these resources are only needed for very short periods to deal with daily or weekly peaks.

Qlik Sense Enterprise SaaS removes this complexity and costs of estimating and managing infrastructure because it is included in the subscription. More importantly, user satisfaction is higher as dealing with increased load is instantaneous, not subject to delays of procurement, installation, and configuration of infrastructure.

When a user accesses an application in Qlik Sense Enterprise SaaS, we initially check if the application is already open on one or more engines. If it is not, or these engines are already under heavy load, Qlik responds in turn by providing additional compute engines dynamically and opening another copy of the application. This autoscaling requires no configuration, management or extra expense from the customer and is transparent to the user. When the resources are not needed, Qlik will reduce the number of copies of the application open.

Managing data assets

Qlik has introduced cataloging capabilities through the catalog tab in the top menu of the Qlik Sense Hub. Switching to the catalog browser view allows users to create and easily navigate spaces, manage space permissions, and view and find content from one place. Enter keywords and/or select filters to locate charts, apps, data, notes, and links. Users can also view the content by owner creator and tag making it easier and faster to manage content and find what is needed, when it's needed.



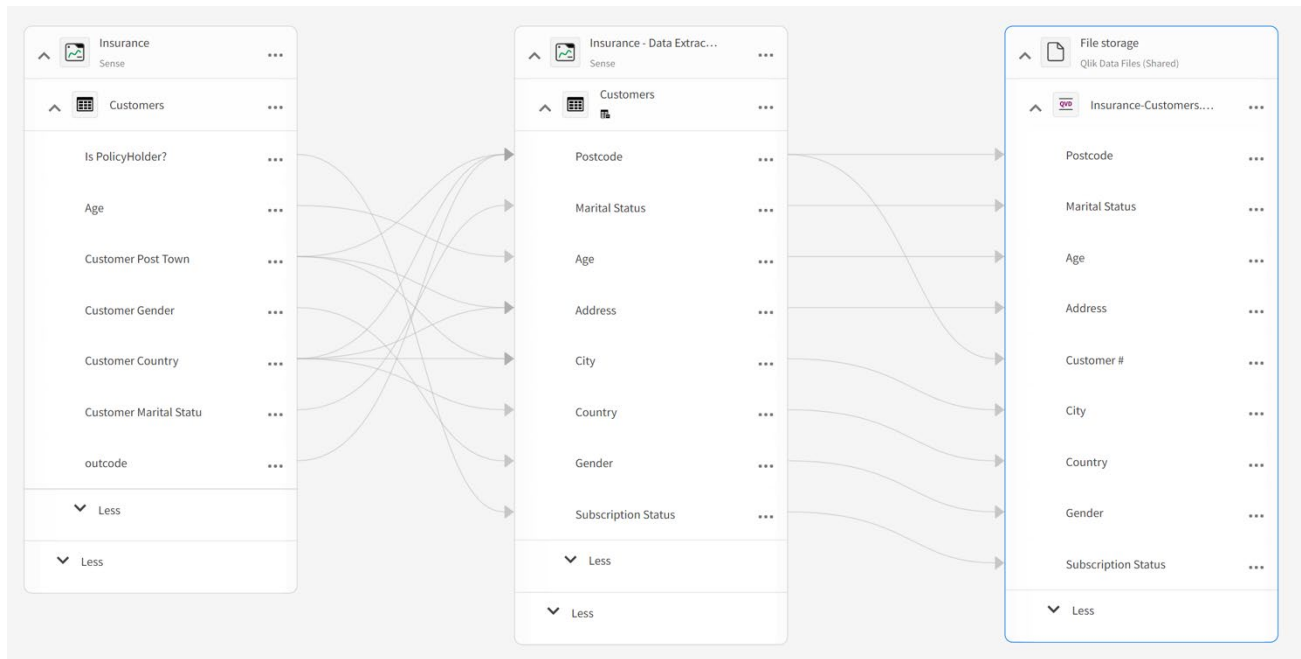
Searching and filtering can be done from the top menu or for additional detail, a vertical pop-out panel is available. A primary benefit of the design is the ability to multiselect the type of objects that users want to filter. Look soon for

catalogued master items, business models, and more. Lastly, the Catalog Content Browser has been developed as a micro-component. Look for this rich search and browsing experience within Data Manager of a Qlik Sense application.

Data Lineage & Impact Analysis

The data lineage process identifies and documents data from its source to target noting any changes as it moves through your data lifecycle. Using Qlik's lineage connectors, Qlik automatically finds and documents any relationships between datasets and across multiple BI tools. This lineage provides visibility on the source and journey of each dataset. Qlik lineage connectors expand Qlik Impact Analysis capabilities to include traceability information from multiple BI tools and data sources.

Qlik supports lineage information from Qlik's client managed products, some 3rd party BI tools, data files and databases.



Field-level lineage allows for detailed investigation into how fields have been calculated and their specific origin across transforms and applications. While you explore the lineage, you can interactively change the base node to another table, application, or field on the screen to focus your investigation.

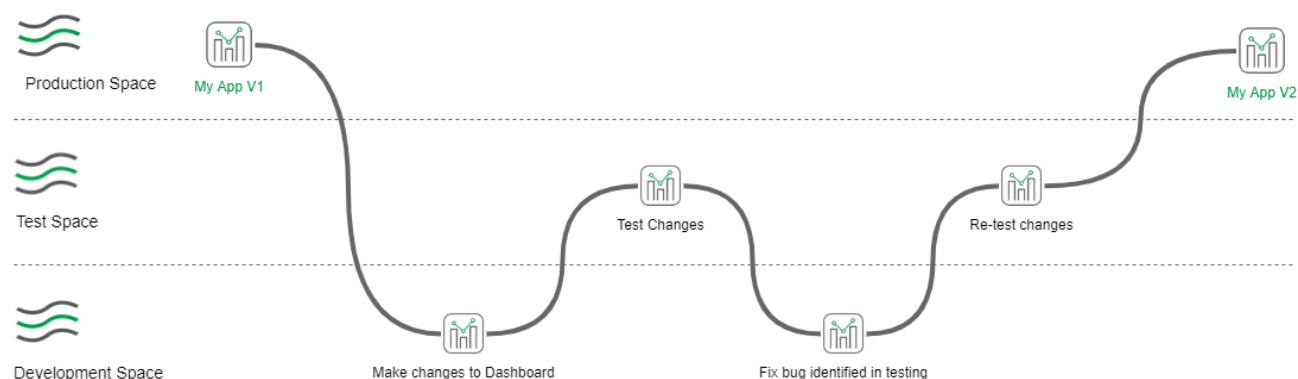
Downstream lineage is called impact analysis because it analyzes which objects will be impacted by changes to your data; these objects are the dependents of the base node. Qlik Cloud provides information and counts by type of dependent objects in a summary view.

Business users examining a given field will have an aggregated summary of downstream impact that delivers insight into:

- Which object types would be impacted by a change to this field including databases, file storage, apps, and links
- What is the number of direct dependencies and indirect dependencies by type
- Who are the owners of the items that are impacted if you make a change

Move apps through a development lifecycle, not development servers

In a traditional BI environment apps would be developed on a development server. Once development was complete, they would be moved to a test server. Issues found in testing would mean several iterations of this process until the application could be deployed to production, requiring a lot of resources and infrastructure to manage. With Qlik Sense Enterprise SaaS, apps are stored in discrete spaces. Each space has its own security settings, data connections and file storage. Customers can create as many development, test and production spaces as needed to suit their software development life cycle. This approach allows much greater flexibility, agility and reduced infrastructure expense than with a traditional on-premises setup.



In the above example, users consume the app in the production space. When a change to the app is requested, a copy is made in the development space and is published to the test space when ready for app testers to review it. Several cycles may occur until the app is ready to be released to production. To facilitate these flows, each space has its own data connections and file storage, so that an app will load the appropriate data for the applicable life-cycle phase.

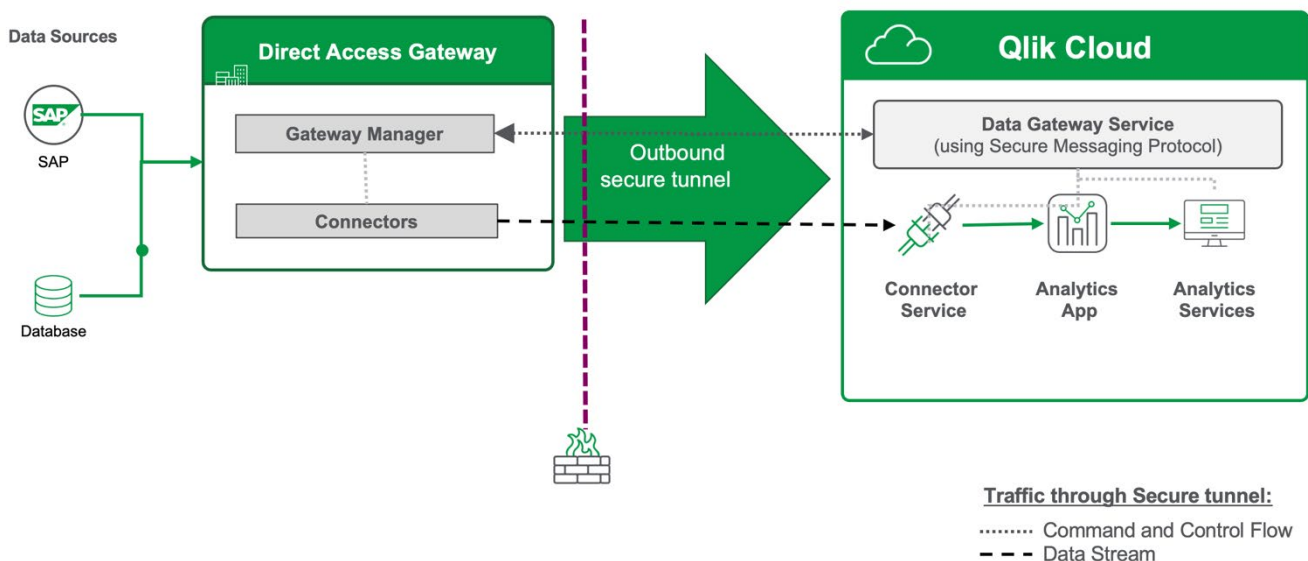
Integrating on-premises data with Qlik Sense Enterprise SaaS

Qlik understands that while many organizations are moving their systems to the cloud, there will always be some systems such as mainframes, that remain on-premises. Additionally, some customers that choose to migrate some systems to private clouds that are not directly accessible from public SaaS environments. Consequently, Qlik provides several solutions to integrate on-premises data sources with Qlik Sense Enterprise SaaS.

Qlik Data Gateway - direct access

Businesses commonly enforce strict firewall policies that block external access to their data sources, whether on-premise or in a private cloud deployment. This presents a challenge when such businesses need to access their data from the cloud for analytics. In the past customers had to choose between pushing this data to Qlik Cloud using tools such as Qlik Data transfer or Qlik Hybrid Data Delivery (see later in this section) or opening up connectivity to these systems to Qlik cloud through their firewalls. For many use-cases none of these options are desirable. Qlik has introduced the Qlik Data Gateway for direct access to overcome this challenge by eliminating the need to open inbound firewall ports.

Qlik Data Gateway for direct access allows Qlik Sense SaaS applications to securely access on-premises data via a data gateway. The gateway is installed in a customer's data center or private cloud and initiates an Outgoing secure reverse tunnel from the gateway to Qlik Cloud via an HTTPS connection. Qlik Cloud is then able to directly connect to the customer's data sources in real time without any requirement to expose these data sources externally.



Qlik DataTransfer™

Qlik DataTransfer is a lightweight utility that is included in Qlik Sense Enterprise SaaS and securely pushes on-premises data and local files to the cloud. It is designed for customers who do not require either a full data integration solution such as Qlik Catalog™ or a full Qlik Sense Enterprise Client-

Managed deployment and do not wish to open firewalls to connect to on premise data. Qlik DataTransfer provides:

- Connection creation and selection dialog to pick source data from standard connectors such as ODBC and REST.
- Ability to create “Datasets” which can run manually or on a schedule to connect to the source data and land this in Qlik Sense Enterprise SaaS and optionally reload an app within the same SaaS space as part of the schedule.
- A “folder watcher” which will also move supported file types (e.g. QVD, CSV) to the data files area within the space of choice and optionally reload an app within the same SaaS space when triggered.
- Capability to reload pre-built Qlik apps on-premises and move these to the SaaS tenant.

Data is uploaded to Qlik Sense enterprise SaaS securely over HTTPS and stored in the customer’s tenant using encryption at rest.

Qlik Cloud Data Services – Hybrid Data Delivery

Qlik Cloud Data Services is the name given to Qlik’s hosted and managed Integration Platform as a Service (iPaaS). Our vision is to provide a broad variety of data integration services aimed at helping users move from passive to active BI.

The first data service to reach general availability is called Hybrid Data Delivery, an enterprise grade integration service. The Hybrid Data Delivery service continuously streams data in near real-time from on-premises systems, such as relational databases, mainframes, and SAP systems, to the Qlik Cloud tenant. QVD’s created by the services are automatically updated whenever the source data changes and are ready for consumption by analytics apps without the need for scripting.

The Hybrid Data Delivery Service works as follows:

- a) Qlik Replicate⁴ tasks are controlled from the tenant and land data from on-premises sources into client-managed cloud storage (currently AWS S3 buckets)
- b) A new Qlik Cloud Data Service asset called “Storage”, then automatically creates, catalogs and maintains QVDs by fetching data from the landing bucket, converting the data into QVD format, cataloging the data sets and delivering the resulting QVD files to the tenant data space. Alternatively, a user could choose to store QVDs in user’s own client managed cloud bucket.

⁴ Note: Qlik Replicate and Qlik Enterprise Manager are required to be installed and configured before using Qlik Cloud Data Services. The software can be obtained from the [Qlik download site](#) and requires separate licensing.

- c) The QVD files are automatically updated whenever the source data source changes and are readily available to users for immediate data analysis and exploration. We call these continuously refreshed data files Active QVDs.

Qlik Data Integration Platform

Qlik's Data Integration Platform is a bundled solution with components such as Qlik Catalog, Qlik Replicate® and Qlik Compose™ for Change Data Capture Streaming, Data Lake Creation, and Data Warehouse Automation, all providing the ability to publish data from a wide breadth of data source end points to cloud storage locations, such as S3 buckets & Cloud data warehouses. These can then be used by Qlik Sense Enterprise SaaS to load apps. Data Integration products which can be used with Qlik Sense Enterprise SaaS include:

- Qlik Replicate - Universal data replication and real-time data ingestion
- Qlik Catalog - A secure, enterprise-scale data catalog to easily find, prepare and deliver analytics-ready data
- Qlik Compose - Agile data lake creation and data warehouse automation

For more information on Qlik's Data Integration Platform see: <https://www.qlik.com/us/products/data-integration-products>.

API and script based data integration

It is possible to move applications to and from the Qlik Cloud platform using either our APIs directly, or via the qlik-cli tool. Applications can be created programmatically, imported, published, and reloaded. They can also be exported with or without data, and many other operations.

Qlik Sense Enterprise Client-Managed for Windows

Qlik Sense Enterprise on Windows provides the ability to automatically synchronize Qlik Sense apps on-premises with Qlik Sense Enterprise SaaS. It is possible to use rules to tag which apps are distributed to Qlik Sense Enterprise SaaS, so only a subset of apps needs to be distributed. This feature allows customers to deploy some apps to Qlik Sense Enterprise SaaS and keep other apps on-premises and/or in a private cloud.

QlikView Publisher

QlikView provides the ability to publish QlikView apps to Qlik Sense Enterprise SaaS through QlikView publisher. This capability allows QlikView customers to significantly reduce infrastructure costs while continuing to reload their QlikView apps on-premises.

Qlik Sense Architecture & Governance

Building on the security and governance features of the Qlik Cloud Platform, Qlik Sense Enterprise SaaS provides a number of features to enhance security and governance around the needs of an analytic environment.

Security for spaces and applications

Securing spaces

Security in spaces are controlled by roles assigned to members directly or via groups when they are added to a space. A role assigned to a member of a space gives that member a set of permissions inside that space and on resources inside the space.

The space owner has full access to the space. Creating a space automatically assigns that user as the 'Owner'. Owners can be changed through the spaces section of the management console.

There are different roles available between shared and managed spaces.

Shared spaces contain the following roles:

- **Can manage** - provides full access and is similar to the owner, with the exception of making changes through the Data load editor or Data manager
- **Can edit** – Can create and modify applications including moving them to or from another space
- **Can view** – Can access applications in the space as well as adding private bookmarks and stories. Can also Monitor visualizations from applications in the hub.
- **Can consume data** – allows users creating an application in their personal space or another shared space they have edit rights for, to consume data files and connections created in this space.

Managed spaces contain the following roles:

- **Can manage** - provides full access and is similar to the owner, with the exception of being unable to publish/republish apps to this space
- **Can publish** - Publish/republish apps to this space

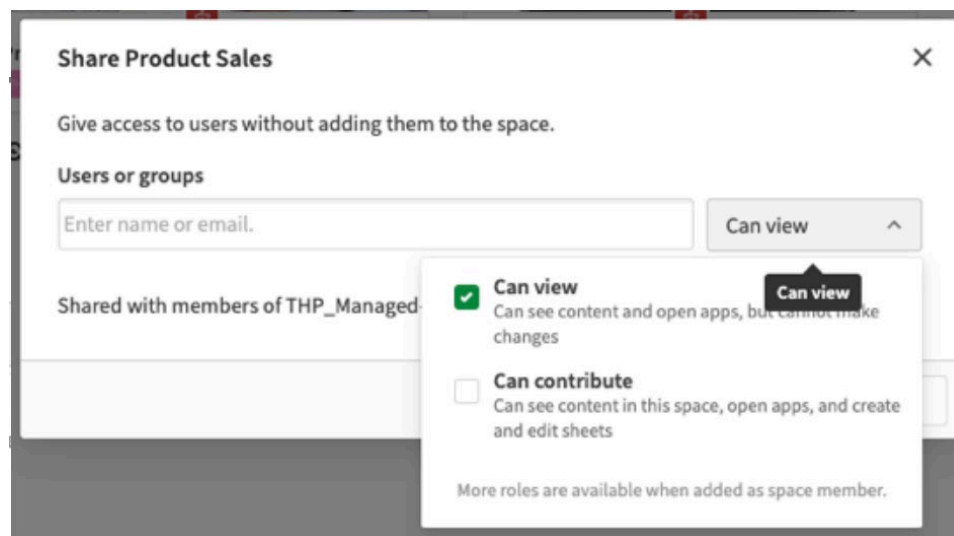
- **Can contribute** – allows consumption and creation of private sheets in applications in this space
- **Can view** – allows consumption of applications in the space.
- **Can consume data** – allows users creating an application in their personal space or another shared space they have edit rights for, to consume data files and connections created in this space.

For more information around managing spaces see [Working with Spaces](#) in our help documentation.

Fine-grain access control

Admins and users now have more options and flexibility for fine-grain security, permissions, and sharing content within their spaces and individual apps. These enhancements allow customers to better scale and organize security permissions across large deployments while making it easy to invite others and share insights.

Space owners, facilitators, and admins can now directly share individual apps with any group or users without adding those users into the space. Shared users and their specific access controls can easily be managed from the Member Section of the managed space.



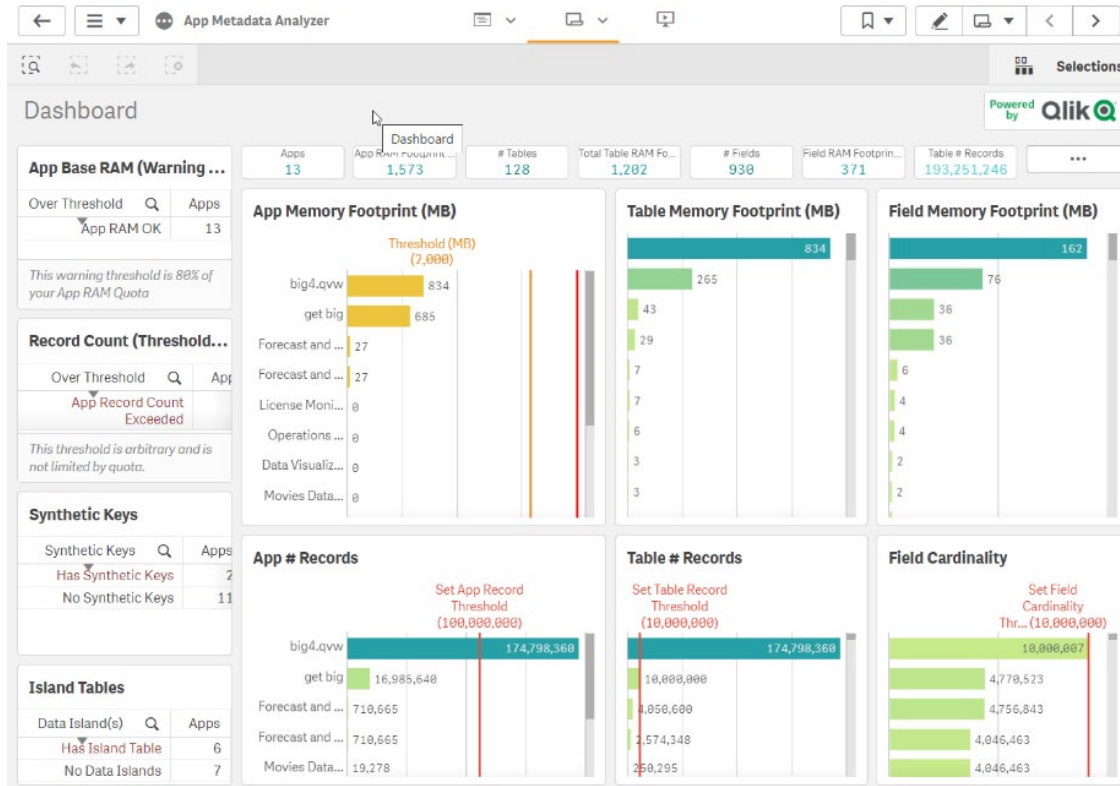
Section access

Section Access is used to control the security of an application. It uses the data model to define authorization at the data level and allows restricted access to data at row and column levels. For more information, read about [Section Access](#) in our help documentation.

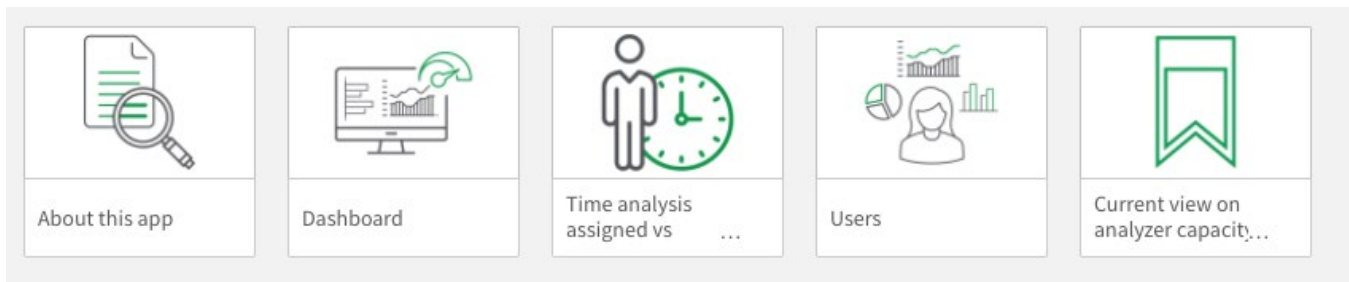
Governing the Qlik Sense Enterprise SaaS tenant

Application governance

Qlik provides several applications to assist customers in governing their Qlik Sense Enterprise SaaS tenant. The App Analyzer provides governance information into customer's Qlik Sense Enterprise SaaS tenant. This app looks at key performance characteristics of apps such as memory usage, cardinality and the data model.



The **Entitlement Analyzer** is available to assist in governing user activities. The app provides insights in areas such as entitlement usage overview across the tenant, Analyzer Capacity usage and how users are using the tenant(s) and if they have the right Entitlement assigned to them.



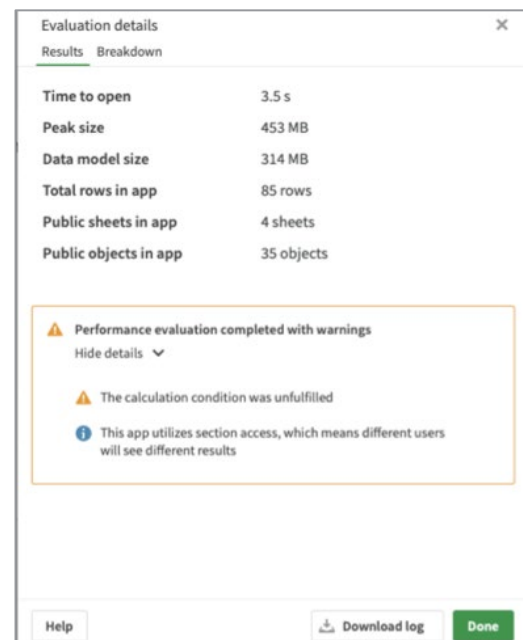
The **Reload Analyzer** provides insights on:

- the Number of reloads by type (Scheduled, Hub, In App, API) and by user
- Data connections and used files of each app's most recent reload
- Reload concurrency and peak reload RAM
- Reload tasks and their respective statuses

At Qlik we are actively looking to provide improved governance options for our users and share these through our support blog at <https://community.qlik.com/>.

Govern and enhance Qlik Sense Applications with the App Evaluation service

The App Evaluation service helps users manage their Qlik Sense Enterprise SaaS instance from a performance perspective. The service captures key metrics on Qlik Sense Enterprise SaaS applications, including increases in application size and length of time to open applications. Further, the service provides feedback on possible reasons for changes, allowing customers to address these issues.



Extending Qlik Sense SaaS security to Mobile

While Qlik Sense Enterprise SaaS has always been accessible from any device via a web browser, to enhance the experience for mobile users Qlik has released a dedicated mobile app for IOS and Android. This application supports both live and offline access to Qlik Sense Enterprise SaaS applications, as well as Data Alerting.

Security is the key consideration in our mobile architecture. Authentication is through the tenant's identity provider mechanism and with stay authenticated for the duration specified by the identity provider. If enabled, a token is stored for offline access, which resets when the re-authenticated online.

Data protection is a critical aspect of our mobile security. All application and cache data stored on mobile devices are encrypted. As with a regular browser connection, traffic between Qlik Sense Enterprise SaaS and the mobile application is encrypted over SSL and secure WebSocket connections. In the event of a lost mobile device, administrators can revoke access for that user, so should someone gain access to that device they would not be able to use the application to see the applications and/or data.

When used in offline mode, Qlik Sense is running natively on the device using the same associative analytics engine running in Qlik Sense Enterprise SaaS, optimized for mobile hardware. Therefore, offline provides a full analytics experience, not simply a set of saved dashboard and reports. Customers can choose to disable offline access at the tenant level if they wish to prevent this. In this case, no application or cache data is persisted to local storage.

Integrating and Expanding Qlik Sense Enterprise SaaS

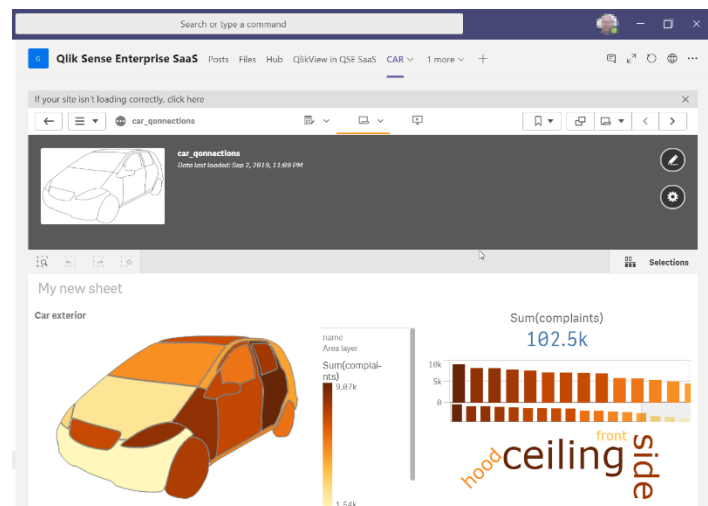
Integrating with your Qlik Sense Enterprise SaaS environment involves both integration at the Qlik Cloud platform level and with the Qlik Sense Enterprise SaaS features you wish to use, which is the focus here. For integrating with the Qlik Cloud platform see the [Qlik Cloud Technical overview](#) document.

Integration approaches

Qlik Sense Enterprise SaaS supports a number of options for integrating Qlik hosted apps into customer's own environment. For detailed information on the options available see <https://qlik.dev/basics/authentication-options>.

Embedding

Qlik Sense Enterprise SaaS apps support embedding in another web portal, or within a tool such as a third-party client. Read more about how to [create mashups and web apps](#) on our help site. Qlik also provides pre-built examples that customers can use to get started on embedding their Qlik apps and visualizations into their mashups and web apps. These examples are available on GitHub here: <https://github.com/qlik-oss/web-integration-examples>.



Webhooks

Webhooks let users integrate Qlik Sense into a workflow by using Qlik Sense system events to trigger actions in a workflow. A webhook is an HTTP callback that passes system event information in JSON format from one application to another. Webhooks can only be created by users with a tenant admin role. Here are some helpful ways to use webhooks:

- Whenever a new app is created, automatically notify the applicable team through Slack.
- When a new team member is added to a tenant, automatically send them a welcome email.

- When a user is deleted from the tenant, automatically update a spreadsheet.

Qlik Reporting Service

To meet the need for certain types of flexibility in reporting, Qlik has introduced the Qlik Reporting Service.

The Qlik Reporting Service is an API that provides the ability to develop multi-page reports that can be distributed to users outside of Qlik Sense Enterprise SaaS. Reports can be developed either through Qlik Application Automation or integrated into a customer's own applications. Reports are created as PDF documents. All Qlik Sense Enterprise SaaS customers are entitled to create up to 100 reports as part of their SaaS subscription.

Qlik Open Source

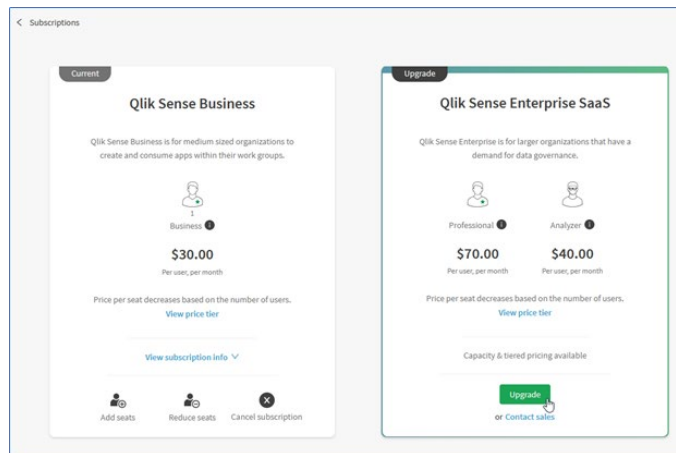
In addition to API governance, Qlik R&D delivers libraries to accelerate development, testing, and integrating of the Qlik Sense Enterprise SaaS platform through Qlik Open Source (<https://github.com/qlik-oss>). A number of these first-party libraries are used in the platform itself, such as:

- **Nebula.js** - a collection of JavaScript libraries, visualizations and CLIs that helps developers build and integrate visualizations on top of the Qlik Associative Engine
- **Enigma.js & Enigma.go** - JavaScript & go lang libraries for consuming the Qlik Associative Engine
- **Gopherciser** - a load testing tool for Qlik Sense Enterprise SaaS

For more information on Qlik Open Source see <https://github.com/qlik-oss/open-source>.

Upgrading from Qlik Sense Business to Qlik Sense Enterprise SaaS

If a Qlik Sense Business customer wishes to upgrade to Qlik Sense Enterprise SaaS and gain additional features and data capacity, they can upgrade their subscription. Qlik allows customers to upgrade a Qlik Sense Business trial or Qlik Sense Business subscription to a Qlik Sense Enterprise SaaS subscription without creating a new tenant so that information and data are maintained.



Summary

Qlik Sense Enterprise SaaS is designed to provide our customers with a service to securely move their analytic workloads to the cloud. Built on the Qlik Cloud platform, Qlik Sense Enterprise SaaS has been designed to automatically scale to meet the workloads of the modern enterprise and provides Qlik customers a platform that can consolidate Qlik Sense, QlikView and other BI apps in a single hub.

With a global presence and a strong focus on security and availability, Qlik Sense Enterprise SaaS provides a safe and secure platform for our global customers. With the ability to choose where the tenant is hosted, customers can ensure their data is close to their location and in a geography that meets their business requirements.

For existing Qlik Sense Enterprise Client-Managed customers, Qlik Sense Enterprise SaaS has the capability to facilitate the transition to SaaS. Customers can choose to continue reloading apps on premise, move some apps to Qlik Sense Enterprise SaaS or use Qlik Data integration tools to access their data sources on-premises while moving consumption to the cloud. Integrated identity providers and flexible deployment and subscription options make this easy to manage and minimizes costs during the transition.

Qlik understands that our customers often want to integrate and embed their analytics and visualizations into their own portals and systems. Therefore, Qlik has and continues to invest in providing integration approaches and supported open sources libraries and tools to make this easier for our customers. With comprehensive APIs and Qlik's developer portal providing resources and examples, Qlik is committed to assisting our customers make Qlik Sense Enterprise SaaS a part of their own solutions.



About Qlik

Qlik's vision is a data-literate world, where everyone can use data and analytics to improve decision-making and solve their most challenging problems. Qlik offers real-time data integration and analytics solutions, powered by Qlik Cloud, to close the gaps between data, insights and action. By transforming data into Active Intelligence, businesses can drive better decisions, improve revenue and profitability, and optimize customer relationships. Qlik serves more than 38,000 active customers in over 100 countries.

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