



# cQube

## cQube – Product Functional Details Document

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**Document released by:**

Arvind Gopalakrishnan

**Document reviewed by:**

Jai Bannur

**Document acceptance by:**

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# 1. Background and Context

EkStep and Tibil Solutions are embarking on a project to create an analytics product which can act as a Collaborative Command Center, '**cQube**' for the education system. This product can be used for monitoring the education system in a state and on a broader scale for monitoring the schools across the state/ districts/ blocks/ clusters and schools.

This document describes the product features, product overview, product functional features and the users of the cQube system.

## **cQube**

cQube is an analytical product which helps the educational ecosystem by providing actionable items/ outcomes to the respective end users/ actors in a controlled manner (through access control). This analytical engine ingests data, analyzes, integrates, stores and creates reports (dashboards and charts).

## 1.1 Use and State of this Document

This document is intended for use by authorized personnel interested in knowing about the requirements of the cQube product.

This document is in its final version and is under change control.

# 2. Product Features

- cQube is an analytics product that should be developed entirely using open source technologies.
- This product should be independent, pluggable, flexible, scalable, compatible and should be deployable in different environments.
- This analytical product should be usable at various scales and multiple hierarchies to analyze data, integrate data, store and create actionable insights using the processed data, as desired by the end user.

## 2.2 How does cQube work?

- Individual entities produce attendance and assessment data and emit them periodically. This emitted data should be processed and analyzed periodically by the cQube product.
- cQube should automatically process this data and generate analytics and visual reports at predefined intervals.
- cQube should have predefined (canned) reports that provide actionable insights. This will enable the stakeholders to take informed decisions to improve the educational system.
- cQube should have to provision to plug-in any other third-party visualization tool to generate customized reports and dashboards.

## 2.3 Actionable insights using cQube

cQube product should generate reports which can be used to derive the following actionable insights:

- Insights derived in individual entities from student attendance reports:
  - o Student attendance percentage - An actor can monitor and review any specific entity based on this report and take respective actions. (Based on how each entity performed).
  - o Information about total number of entities and total number of students per entity (from lowest level to highest level).
- Insights derived from teacher attendance reports:
  - o Teacher attendance percentage - An actor can monitor and review any specific entity based on this report and take respective actions. (Based on how each entity performed).
  - o Total Number of teachers present in an entity and the number of students per teacher present in an entity.

- Insights derived from assessment reports:
  - o Total assessment results in individual entities – An actor can monitor and review any specific entity and specific individual and identification of the areas of improvement based on this report.
  - o An actor can identify entities which are performing well and the entities which are not performing well and take necessary actions.
  
- Insights derived from inspection reports:
  - o Total Number of inspections conducted across entities – An actor can monitor and review any specific entity and specific individual and identification of the areas of improvement based on this report.
  - o An actor can identify the number of entities per inspector.
  - o An actor can identify discrepancies in the data entered by the inspectors – number of visits to schools and the actual visit details.
  - o An actor should be able to view the inspector's travel map.

### 3. cQube – overview

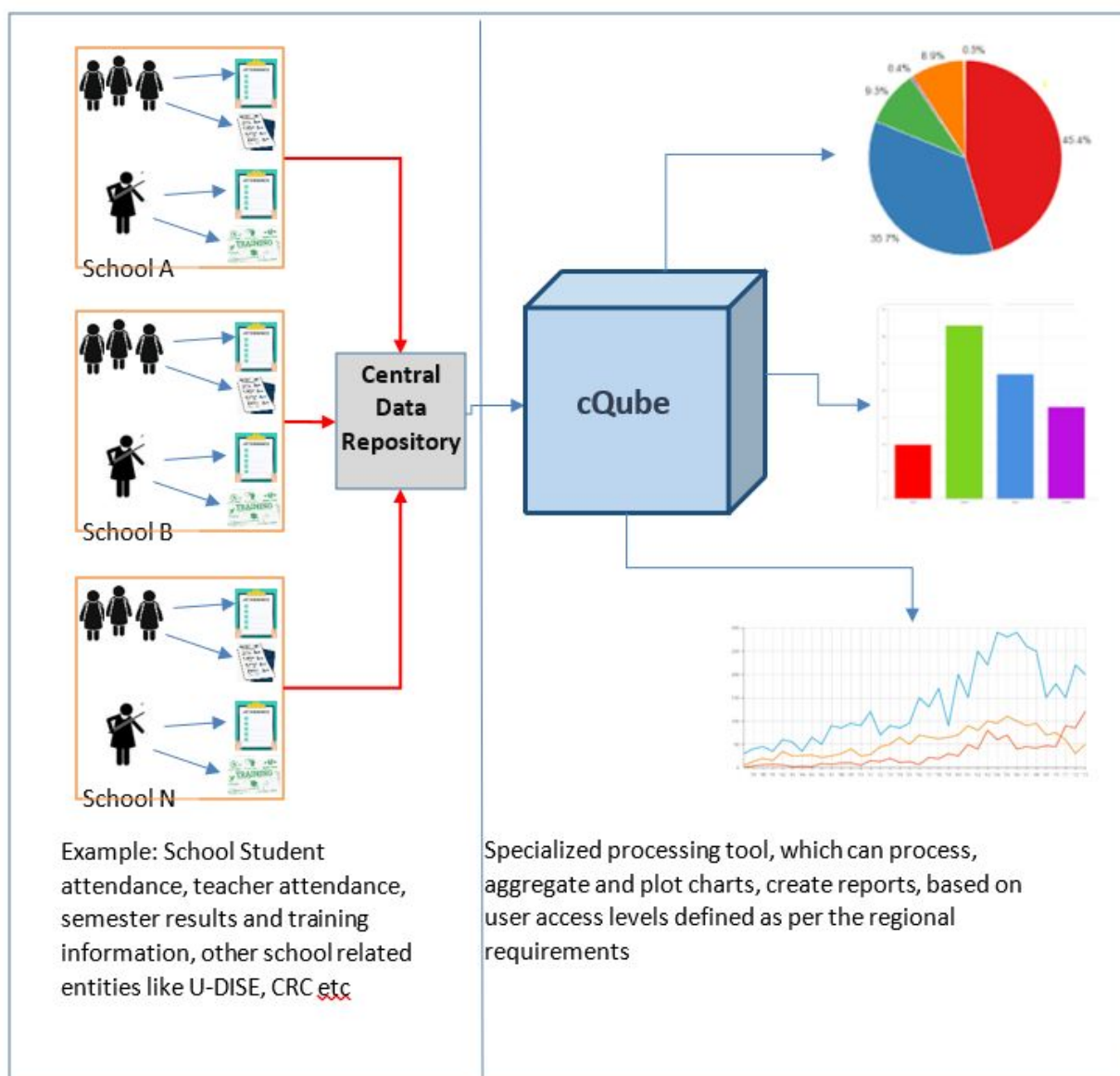


Figure 1: Overview of the cQube project.

This diagram shows a simple overview of how the complete system is envisaged.

How should the cQube analytics engine work?

- The figure below shows the suggested cQube analytics engine.
- The blue box shows the components of the cQube engine which should work with a single step installation.
- The data emitted enters the cQube engine where it is stored, transitioned in the data pipeline, processed, aggregated and reports are created for regular users and power users.
- The data processed should be made available for ad-hoc report creation using third party visualization tools.

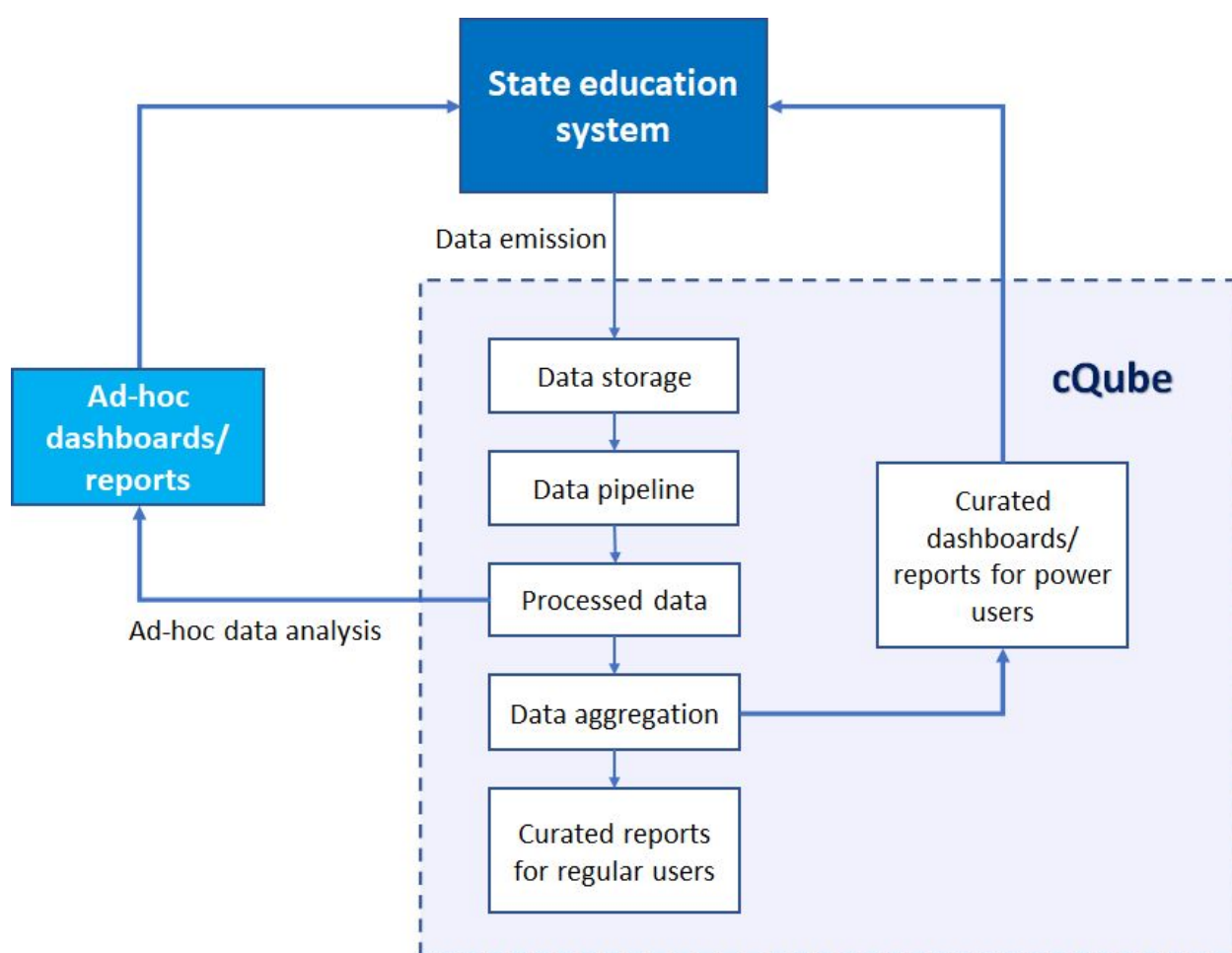


Figure 2: The cQube analytics engine.

- User access controls should be given so that designated administrators can see only their reports/ data, e.g: school administrators can see only their school's data/ reports, district level administrators can see data/ reports from the schools belonging only to their district.
- The users of the cQube are divided into the following categories:
  1. Admin
  2. Report Viewer
  3. Report creator
  4. Ad-hoc user
  5. Data emission user
- The cQube product should do analytics and publish the dashboards/ reports on the web for the regular users. A regular user can access dashboards through the web as provided by the state education department as defined/ allowed by them.
- cQube should provide a data interface to power users for any kind of ad-hoc analytics using third party commercial visualization tools.
- The power users should be able to access the reports/ dashboards and all of its data with the help of a web interface and appropriate login credentials.
- The cQube product should provide data quality metrics to power users to monitor the quality and health of data input.

## 4.1 cQube Configuration

The cQube product should be configurable to allow easy installation at any new site without repetitive tasks.

Configurations are done as a part of the installation process. All the sensible information like URLs and passwords are saved and encrypted by default. Configuration also is an automated process and no manual interaction is required.

With the configuration stage cQube has the flexibility to support multiple state data with minimal changes. The cQube configuration stage is an automatic process.



## 4.2 Data Emission for cQube

The cQube product needs data in a predefined format and the data source systems in any state have to emit data as per the requirements. Automatic schedulers should emit this data at regular intervals as required by the users. The periodicity of data emissions could be daily with respect to attendance data or monthly with respect to semester data. cQube should be designed to be completely decoupled from the data sources that are emitting the data.

## 4.3 cQube Visualization Engine

cQube product should have a set of standardized in-built charts/ reports which will be rendered through a web interface.

## 4.4 cQube Functional Prerequisites

In order to accomplish the above articulated features, the cQube product requires emitted data from the following sources:

- School wise databases
- Student attendance data
- Teacher attendance data
- Semester assessment data
- Training program information data
- U-DISE data
- CRC data
- Any other master data

## 4.5 System Security Prerequisites for any State using the cQube Product

- Integrated technical safeguards to ensure a high level of privacy and security.
- Back end server(s), including data encryption and transmission.
- Administrator controlled username and password access.
- Automatic timeout/ log-off.
- Administrator controlled user level read, write, edit and delete capabilities.
- Administrator controlled user level module and sub-module access.



- There has to be high-speed secured internet connectivity with firewalls.
- There has to be regular scheduled back-ups of the cQube product and data.

## 4.6 cQube Performance Requirements

This section provides a detailed description of the performance requirements of the cQube product.

- The cQube software needs to be updated regularly and there has to be regular system maintenance.
- The cQube performance should be designed to have an optimal performance using stored and processed data. The performance of cQube may vary and has to be monitored if there is a need for real time data analysis and visualization.
- The cQube data ingestion process requires good internet connectivity as it impacts the cQube performance and report creation.
- The performance of the cQube product will significantly depend on the minimum software and hardware requirements suggested.

## 5. Regulations and Compliance

### 5.1 Quality, Reliability and Safety Requirements

- All the development should be done in a secure environment.
- Version control should be followed and codes should be made available in a designated repository.
- Programs should be reviewed and thoroughly tested.
- The cQube product and code should be volume tested for scalability before implementation.