C3 IoT Platform™ is a comprehensive design, development, provisioning, and operating platform for deploying industrial-scale cyber physical applications. C3 IoT Platform enables the rapid deployment of Software-as-a-Service (SaaS) applications that integrate and process highly dynamic data sets, sensor networks, industrial equipment, and enterprise and extraprise information system integrations. The platform advances rigorous predictive analytics, data exploration, machine learning, and complex data visualization with responsive design. C3 IoT Platform is used to build next generation enterprise IoT applications for Telecom, Retail, Financial Services, Utilities, Oil and Gas, Aerospace, Government, and Industrials to enable smart connected products, customers, manufacturers, and suppliers.

C3 IoT Platform is in production use as the IoT operating platform at enterprise scale at 20 companies in the United States and Europe. The C3 IoT Platform integrates production data from hundreds of independent data sources and tens of millions of sensors aggregated using highly scalable elastic computation and storage architectures, providing processing capabilities that exceed 1.5 million writes per second.

C3 IoT Platform is commonly used to develop enterprise applications using real-time telemetry data correlated with operational system data and machine learning to deliver significantly improved customer service through predictive maintenance, capital allocation and planning, loss/fraud detection, sensor network health, forecasting, customer segmentation and targeting, and digital customer marketing and engagement.

"C3 IoT proved to us that its elastic, cloud-based platform is capable of aggregating real-time data from Enel’s grid sensors and smart meters, correlating those data with operational systems data, and importantly, extending our operational insight by subjecting those data to a comprehensive set of analytics and machine learning algorithms."

– Fabio Veronese, Vice President of Global ICT for Enel
**Rapid Application Development Through Built-in Tools**

The expressive power of C3 IoT Platform is a distinct benefit that enables massive productivity improvements for application developers. This power is enabled through C3 Tools™, a family of integrated development and configuration applications.

C3 Tools enables analysts and developers to instantiate and extend C3 IoT Platform data and canonical object models, design analytics, develop streamlining and iterative analytics, launch MapReduce jobs, configure and extend existing applications, and develop new applications.

Each tool has a user-friendly, visually compelling interface that makes navigation and customization intuitive. Developers and analysts can easily derive additional insights from their data.

C3 IoT Platform machine learning leverages the cloud to aggregate ALL of the enterprise, environmental, marketing partner, and customer data into a unified, federated cloud image for analysis. Advanced machine learning techniques are employed to continuously improve analytic algorithms and generate increasingly accurate results.

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**C3 IoT Platform Applications**

- **C3 Capital Asset Planning™**
- **C3 Fraud Detection™**
- **C3 Predictive Maintenance™**
- **C3 Energy Management™**

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**C3 Type System**

- **MACHINE LEARNING / PREDICTIONS**
  - Basic Statistics
    - Mean
    - Variance
    - Median
    - Percentile
  - Classification & Regression
    - Linear models (SVM, logistic regression, linear regression)
    - Decision Trees / Random Decision Forests
    - None
  - Dimensionality Reduction
    - PCA
    - ICA
    - LDA
  - Optimization
    - Non-linear optimization (SLSQP)
    - Limited-memory BFGS (L-BFGS)
    - BFGS
  - Collaborative Filtering
    - Alternating least squares
  - Clustering
    - K-means
  - Feature Selection
    - Univariate feature selection
    - Regression forward selection

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**CONTINUOUS DATA PROCESSING**

- **Batch Services**
  - HDFS
  - Oozie
- **Stream Services**
  - Kafka
  - Storm
- **Continuous Analytics Processing**
  - Monitoring
  - Logging
  - Profiling
  - Time Series
- **Inference Processing**
  - In-memory

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**C3 IoT Platform Services**

- **PLATFOPM SERVICES**
  - Analytics
  - Application Logic
  - APIs
- **Authentication**
  - Authorization
  - Auto-scaling
- **Data Deployment**
  - Logging
- **Monitoring**
  - Multi-Facility
  - Distributed Facility/Cloud
- **System Management**
  - Scheduler
Deploy IoT Applications in an Open, Scalable, Secure, Cloud-Based Environment

C3 IoT Platform provides the services that developers and data scientists need to create (and extend) applications and analytics based on large-scale heterogeneous smart device networks. C3 IoT Platform is a complete and cohesive, tried, tested, and proven, fully integrated production platform for designing, developing, deploying, provisioning, and managing industrial scale mission critical IoT applications.

Application Logic
Application Logic Services seamlessly implement complex application functions by adding custom business rules using Javascript

Data
The Data Services layer is responsible for persisting (storing) large volumes of data, while also making data readily available for analytical calculations

Deployment
Deployment Services enable users to leverage the C3 IoT Platform for application deployment

Data Integration
Integration Services rapidly, securely, and cost-effectively aggregate internal and external data to deliver end-to-end system visibility

Machine Learning
Machine Learning Services provide a streamlined experience for data scientists of all skill levels by supporting web-browser based program setup, drag and drop gestures, and simple data flow graphs to set up experiments

Analytics
Analytics Services provide users with a rules execution engine and a comprehensive set of functions for querying, transforming, and analyzing time series data

Management
With C3 IoT Platform, users have access to detailed performance, security, and usage data on all applications

APIs
API Services provide users with an open-cloud platform that delivers a robust set of APIs

Simple Workflow
Workflow Services enable you to manage workflows within your application

Customer Case Studies

C3 IoT Platform enables companies to realize dramatic advances in their systems’ safety, reliability, cost-efficiency, and environmental impact.

Engie (FORMERLY GDF SUEZ)
- Support for high frequency (1s) data transfer from smart thermostats
- 6 different source systems provide data to C3 IoT Platform
- Scalable support for millions of thermostats and meters
- Support for complex rate calculations, including time of use rates
- Advanced analytics, alerts, and application logic developed by Engie
- APIs used for native iPad applications and web to control the home

Exelon
- 2 million predictions per day across sensor network health and fraud detection
- 12 unique source systems provide data to C3 IoT Platform
- 42 distinct extracts, both as daily batch files and message integrations
- 20 TB federated cloud image of data
- 60 billion rows of data aggregated, federated, and analyzed
- 8 GB / 220 million rows of new data delivered each day to the platform
- 650 analytic signals in use across C3 IoT applications

ENGIE
- 2 million predictions per day across sensor network health and fraud detection
- 13 unique source systems provide data to C3 IoT Platform
- 1 Petabyte unified cloud data image
- 1.7 trillion rows of data aggregated, federated, and analyzed annually
- 7 trillion rows representing 5 years of historical data
- 2500 analytic signals in use across C3 IoT applications
- 12 million predictions per day across smart meters and predictive maintenance for distribution, conventional generation, and renewable assets
- Data scientist using C3 IoT Platform to explore data and develop new analytics

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