How CA Datacom® DBAs Leverage Open Source and APIs for Monitoring

Introducing the CA Datacom RESTful API

CA Datacom Representational State Transfer (REST) Application Programming Interface (API) provides database administrators (DBAs) the ability to quickly and easily access data to analyze system issues. DBAs can then automate processes and alerts to create intelligent recommendations for tuning. By leveraging the CA Datacom RESTful API modern tooling can be used, offering flexibility of choice for users to work in familiar environments. The data from a RESTful invocation is returned in JavaScript Object Notation (JSON) which is simple to consume and parse with modern programming languages.

This white paper will outline the importance of APIs and share insights on how the CA Datacom RESTful API can be used, along with real-world examples and benefits. Data is the most valuable asset for businesses, and CA Datacom houses this data, fueling our customers' mission-critical systems. It is crucial that customers have the ability to leverage their existing investments and skills to manage and maintain core systems to support their end users in order to compete and succeed in their respective industries.

Why CA Datacom RESTful APIs and What Problems Do They Solve?

In many cases, organizations who have seasoned users maintaining and managing their business-essential systems face upcoming retirements and a need to backfill these critical roles, often with users who are unfamiliar with the mainframe or CA Datacom. Opening up and making our databases more extensible through the use of APIs and services is key in simplifying and automating every day user experiences. The CA Datacom RESTful API makes it easier to maintain existing applications, build new systems, and manage the ongoing health of mission critical systems. APIs provide modern, scalable access to z/OS services, tools, and data.

With the CA Datacom RESTful API, you can use modern development tools to maintain your CA Datacom applications and leverage your mainframe investment.

REST Assured: Your Business Data Is Not Exposed

The CA Datacom RESTful API is in the category of System APIs—the data returned (JSON) represents CA Datacom system data and performance statistics. The CA Datacom RESTful API contains functions for viewing and maintaining your CA Datacom databases while keeping your data protected.

Figure 1: CA Datacom RESTful API Exposes CA Datacom System Data and not Application or Personal Database Data
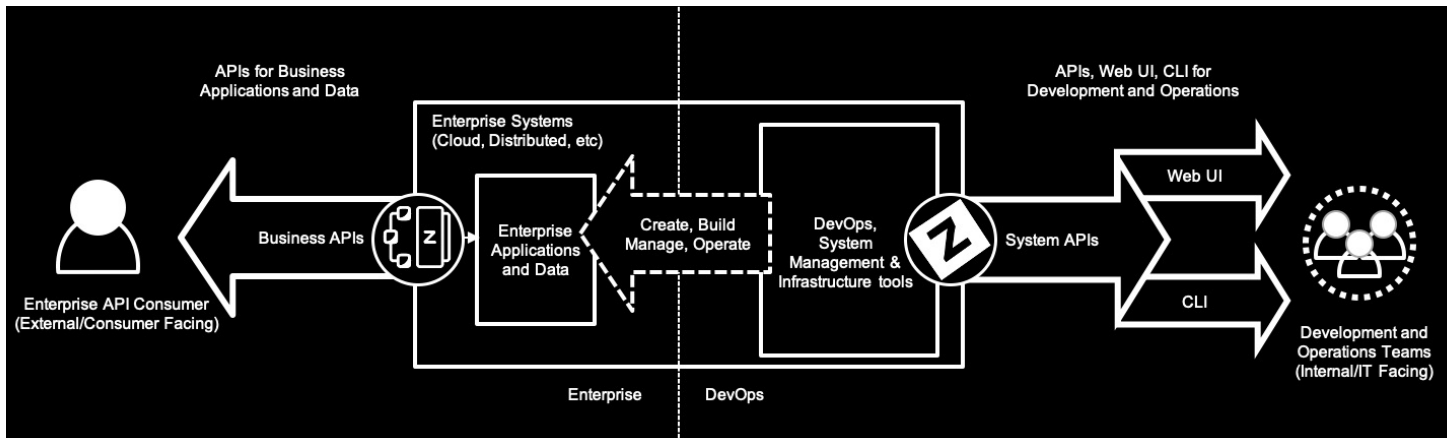
As part of the Broadcom CA Database modernization strategy, APIs play a role in transforming the mainframe for hybrid IT by making the mainframe a more integrated, agile platform. The CA Datacom RESTful API can automate database application maintenance and administration. The CA Datacom RESTful API allows administrators of online systems to monitor operations to see trends and recognize unusual conditions that can indicate problems.

Historically, a CA Datacom DBA analyzed problems by relying on mainframe ISPF access. Although this was acceptable for an experienced DBA who was familiar with CA Datacom and the mainframe world, this environment is not ideal for a new or next-generation user of CA Datacom who is unfamiliar with the product and ISPF navigation. APIs help address this challenge by providing a modern and flexible way to interact with the traditional mainframe platform, easing new DBAs and developers into mainframe roles by allowing them to work with tools and environments familiar to them.

Embrace Open for Speed and Agility

Our CA Database modernization strategy aligns with the overarching product strategy of Broadcom and the direction to "Embrace Open" and deliver at the speed of business. By leveraging open source technologies and taking an API approach, our customers are able to integrate the mainframe with everything—data, apps, and services—from mobile to mainframe. This approach empowers end users to be more agile using tools they are familiar with and shielded from the perceived complexity of the mainframe.

With the inception of Zowe, an open source framework for mainframe, the platform enables customers to securely develop and manage applications like any other cloud-based platform. The framework and its capabilities accelerate mainframe application development with modern DevOps tools, while introducing new levels of automation and management of infrastructure and systems. By providing emerging mainframe users with these valuable technologies, Zowe helps in sustaining the mainframe environment by attracting and retaining next-generation talent.

The CA Datacom RESTful API is Zowe Conformant and can be integrated with the Zowe/Brightside API Mediation Layer. Conformance with Zowe ensures that you can expect a high level of common functionality, interoperability, and user experience. Leveraging the CA Datacom RESTful API standalone or in conjunction with Zowe to integrate with open source tooling and dashboards is a powerful way to enhance and simplify the user experience for new DBAs and other users.

Supported Actions

The CA Datacom API enables the following actions to manage and monitor your CA Datacom databases:

- Query the Dynamic Systems tables in a Multi-User Facility (MUF)
- Monitor growth of Datacom datasets, log file, and investigate performance

Example Use Cases

As a developer or database administrator, you can use the RESTful API in the following ways:

- Enable client dashboards or applications to view system and performance data
- Enable automated warnings and recommendations to avoid critical system risks and outages
- Obtain flexibility to leverage modern, user-friendly tooling to improve the user experience

Figure 2: CA Datacom Databases Remain Safely Secured as the System of Record
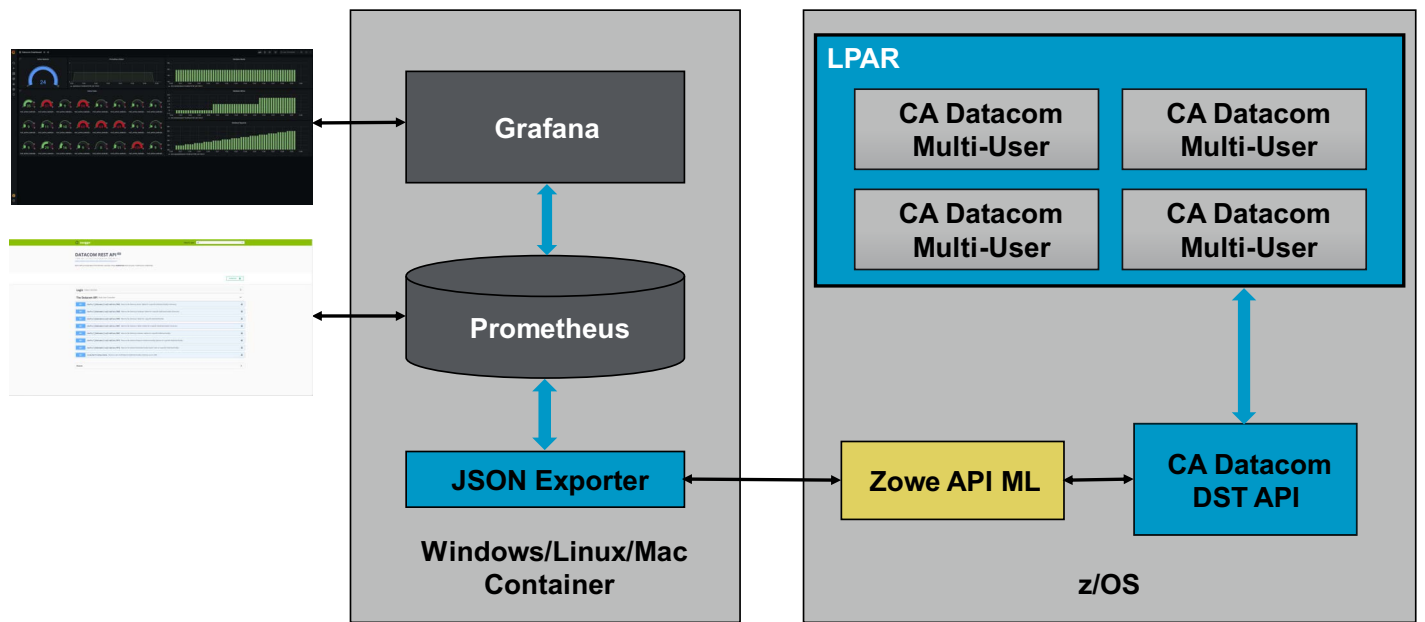
CA Datacom RESTful API, deployed on z/OS UNIX System Services (USS), utilizes Transport Layer Security (TLS) certificates, secured HTTP connection (HTTPS) protocol, and Secure Sockets Layer (SSL). In addition, API functions can be secured with External Security Managers (ESMs).

Simplifying Performance

Maintaining the high level of performance of your CA Datacom databases is essential. By lowering CPU usage and response times, you can reduce your total cost of ownership (TCO) and obtain the highest possible throughput, while enabling as much work to get done as possible. While the vast flexibility and options within CA Datacom enable superior reliability and continuity for your essential core business, they may be overwhelming for new DBAs who might not know where to start.

How can years of experienced DBA knowledge be retained and utilized to continuously tune and improve your databases? CA Datacom stores an abundant amount of performance related metrics that can be viewed within CA Datacom through the following ways:

- CA SYSVIEW
- CXX Report
- PXX Report
- DBSQLPR Batch Job
- Multi-User Facility (MUF) end of job statistics

However, if you do not know what you are looking for, this data may be indistinguishable and confusing. Report outputs span several pages and contain rows and columns of numerical data that require detailed analysis and correlation to form meaningful conclusions.

Simplify the User Experience

Scripting or coding languages can be used to parse and retrieve relevant data to compare values, determine performance issues, produce alerts, and therefore greatly reduce the length of time spent analyzing outputs. Through the use of the CA Datacom RESTful API calls, the values are returned in JSON format, which can be easily handled by many modern programming languages.

The following code example shows the JSON response from CA Datacom RESTful HTTP requests to return a list of Active Systems. The experienced DBA would be aware of the Multi-User Facility environments and would seek to query and obtain relevant statistics about them. The Active Systems endpoint opens the DBA to further opportunities to gather other information about a specific Multi-User instance (Directory Tables, Options, Active Users, and so on).

```
[
  {
    "multiUserFacilityJobName": "SVL2MUFF",
    "multiUserFacilityName": "SVMUFF",
    "multiUserFacilityJobId": "JOB35827",
    "enabledDateTime": "2021-03-08T17:52:44",
    "multiUserFacilityType": "DB",
    "version": "15.1",
    "currentCpu": 2,
    "databaseRequestsCount": 842,
    "physicalReadsCount": 506,
    "physicalWritesCount": 442,
    "cpuSecondsInTwoMin": 0,
    "databaseRequestsInTwoMin": 0,
    "physicalReadsInTwoMin": 0,
    "physicalWritesInTwoMin": 0
  },
  {
    "multiUserFacilityJobName": "QAMUFR",
    "multiUserFacilityName": "MUFR1",
```

```
    "multiUserFacilityJobId": "JOB35429",
    "enabledDateTime": "2021-03-08T17:34:12",
    "multiUserFacilityType": "DB",
    "version": "15.1",
    "currentCpu": 0,
    "databaseRequestsCount": 1425,
    "physicalReadsCount": 542,
    "physicalWritesCount": 131,
    "cpuSecondsInTwoMin": 0,
    "databaseRequestsInTwoMin": 0,
    "physicalReadsInTwoMin": 0,
    "physicalWritesInTwoMin": 0
  }
]
```

Building the Future

Time-consuming and manual performance diagnostic activities performed by experienced DBAs can be turned into reusable scripts or programs, capturing the knowledge and expertise for the next generation of mainframe users. Problem detection and root cause analysis is simplified, saving valuable time to address issues before business impacts occur. By leveraging the CA Datacom RESTful API to invoke repeatable processes, you have increased flexibility to drill down into the data, form insights, and determine a meaningful understanding of the relationships for corrective actions.

The following Python code shows an example of how a CA Datacom RESTful API HTTP Requests is used to display Active Systems for an LPAR CA Datacom instance:

```
import requests

url = "https://myhost:myport/api/v1/svw/ActiveSystems"
headers = {
        "cache-control": "no-cache",
        "accept": "application/json;charset=UTF-8",
        "cookie": "XSRF-TOKEN mytokenvalue",
        "Authorization": "Basic myauth"
}
response = requests.request("GET", url, headers=headers, verify=False)
```

DevOps Automation and Continuous Delivery

By using repeatable scripts or capturing the logic of rules, performance impacts can be obtained and compared before and after CA Datacom system or application changes to ensure quality assurance and stability. Expected or target values for performance statistics become part of the DevOps process, where tests are run on an automation pipeline within the development cycle. The CA Datacom RESTful API enables you to retrieve data to help analyze accuracy and performance differences within your CI/CD pipelines for continuous deployment best practices. The open access to the various combinations of data provides you with countless opportunities, as well as more freedom and control.

CA Datacom system and database benchmarks can be automated with the CA Datacom RESTful API by utilizing scripting logic to validate performance metric ranges during the development cycle. The example in Figure 3 displays various statistics that, without automation, would need to be manually analyzed and compared.

With end-to-end mainframe DevOps, customers can achieve greater business agility to deliver innovations and to keep pace with business-centric demands. Existing DevOps solutions and products that are popular today leverage RESTful APIs and can be used to accelerate and automate mainframe development across hybrid and cross-platform applications and ecosystems.

Modern and Graphical Real-Time Monitoring

Open source dashboard tools are familiar to the next-generation workforce and are generally more visually appealing and attractive, providing an alternative option for database monitoring without displacing existing tools and monitoring methods. Embracing open source solutions helps save costs and improves the overall return on investment (ROI) for integrating your mainframe and empowering enterprise innovation.

Would you like to deliver a better user experience, improve slow manual processes, and ease resource constraints? The CA Datacom RESTful API enables you to move beyond traditional approaches and to move from reactive mode to proactive techniques. Data is more sharable, easy to access, and supports self-service.

Figure 3: Sample Use Case

In Figure 3, a JSON exporter invokes the CA Datacom RESTful API every five minutes, populates a time series database called Prometheus, and is represented graphically by a web-enabled analytics product called Grafana. These tools not only aid displays but are configurable for alerts and rules logic.

With enhanced visualization to various performance metrics, DBAs can more easily monitor operations to see trends and recognize unusual conditions that can indicate problems. Statistics exposed by the CA Datacom RESTful API can be collected at regular intervals for further analytical and historical diagnostics and queries. Conditions, such as high CPU utilization, can be monitored by setting thresholds in the dashboard tool or generating alerts and notification emails. RESTful API calls and JSON data formats can even be consumed by familiar tools, such as Microsoft Excel, so that you can feed data into Excel reports or click a button that invokes and retrieves a metric value. Embracing open source and APIs can help you to deliver at the speed of business, securely and predictively, so that you can leverage systems data and services from mobile to mainframe.

Leveraging Your Investments for Future Growth

The CA Datacom RESTful API builds upon the existing value that customers have invested in the CA Datacom mission-critical systems that have grown and supported their businesses for decades. CA Datacom is a proven, reliable, scalable, and high-performance database management system. Our product strategy of "Embrace Open" positions us to be more agile in serving our customers' modernization needs to optimize, simplify, automate, and help further exploit the benefits of the platform while expanding the pool of talent. The end goal is to enable our customers to leverage their existing investment and transform user experiences by opening up CA Datacom through APIs.

Get Started

- If you are a licensed CA Datacom/DB customer running the latest version (15.1), the CA Datacom RESTful API is available to you as part of the base license.
- Download your copy of CA Datacom RESTful API online at Support. To install your product, follow the installation procedures for your product at Tech Docs. If you have any questions or require assistance, contact your local technical support group at broadcom.com/support/software/contact or visit the Support Portal.
- Visit the CA Datacom CADRE Community site to participate in conversations regarding the CA Datacom RESTful API or add recommendations on what we should focus on next.
- Learn more by watching CA Datacom RESTful API: Overview and Demo (a webcast replay).
- Learn more by watching APIs and Integration Using Open Source Monitoring Tools, delivered by David Ross, CA Database Architect (David.Ross@broadcom.com).
- For more information or a deep-dive discussion, contact Sheila Miller (Sheila.Miller2@broadcom.com) or Dale Russell (Dale.Russell@broadcom.com).

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