Oracle GoldenGate: Innovations for Another 20 Years

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ABSTRACT
Over the past 20 years the GoldenGate data replication platform has evolved from a startup technology targeted for ATM bank networks to what is now a global phenomenon used in every industry by 1000’s of businesses on every continent of the planet. By most measures, GoldenGate has become the most successful integration product in the history of enterprise software.

What started it all was an intense focus on solving the most demanding business continuity challenges that demand zero-downtime of databases and constant availability of important business data. As the technology advanced further, it became widely used for high-end analytic data warehouses and decision support scenarios for most of the Global 2000 industrial base.

After 20 years of being on top, there are a whole new set of innovations that will propel the GoldenGate technology for another two decades of market dominance. These recent innovations include:

- **Non-Relational Data Support** – for SaaS Applications, Big Data, and Cloud
- **Kernel Integration with Oracle Database** – far better performance than any other vendor
- **Remote Capture for Non-Oracle Databases** – reduced workloads and simpler admin
- **Simplification, Automation and Self-Service** – no need for DBAs with most actions
- **Microservices Core Foundation** – more secure, more modular, and easier to work with
- **Simplified, Open Framework for Monitoring** – more choices for DevOps
- **Containers, Kubernetes and Docker** – faster and easier to deploy GoldenGate
- **Stream Processing and Stream Analytics** – added value with event processing
- **Autonomous Cloud** – let Oracle Cloud do the patching and optimizing for you
- **Low-Cost (Pay As You Go) Subscriptions** – GoldenGate for the cost of a cup of coffee

The remainder of this paper will provide more details for these innovations and explain how they will drive business results for the kind of modern digital transformation that IT and business leaders are seeking today.
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ABOUT ORACLE GOLDENGATE

Oracle GoldenGate (GG) sets the standard for high-speed data replication used in everyday applications like ATM cash machines, point-of-sale systems, eCommerce, online shopping websites, airline booking systems, social media and mobile apps. Typical technical use cases include:

❖ Database Zero Downtime
❖ Data Feeds for Data Warehouse
❖ Data Ingest for Data Lakes
❖ Foundation for Stream Analytics

For more than 20 years GoldenGate has been the industry-leading data replication tool in the market. Originally a startup in San Francisco, the GoldenGate Software company specialized in disaster recovery and high availability for the Tandem Enscribe database, which was (and still is) the backbone for many banking platforms. Oracle acquired GoldenGate in 2009 and has subsequently continued to invest heavily in the solution as part of an overall commitment to integration, availability and Cloud.

Data replication is even more necessary today than it was when GoldenGate was originally conceived in the 1990’s.

20 YEARS OF INNOVATION

When GoldenGate Software (the company) was founded, there were only a small handful of Information Technology (IT) systems which were so important that they could never fail. Banking and airline systems, and some military IT systems were so important that they required many levels of redundancy to ensure continuous availability of the application software service levels.

The original foundation for innovation at GoldenGate Software was the concept of “transaction-safe, logical replication” which simply means being able to replay database-quality transactions across wide-area networks.

Continuous Availability and Disaster Recovery

The emergence of logical replication was important because it allowed IT to separate data stores far enough apart to operate on different power grids. So, if one power grid failed then the replicated database on the other power grid could still continue its processing.

Initially the Tandem Non-Stop database was crucial for the startup’s growth, but over time GoldenGate expanded to include database support for Oracle, SQL Server, DB2/z, DB2/I, DB2/LUW, Sybase, Informix, MySQL etc.

This use case for zero downtime continuous availability remains a core strength of GoldenGate today and most consumers have personally benefitted from a GoldenGate high availability solution at their banks, airlines, local grocery stores and even from their favorite social media websites.

As the only replication tool on the market that comes from this proven and sustained heritage of online, disaster recovery solutions, GoldenGate’s DNA was poised to play an important role in another growing software market – data warehouses and analytics.
Trickle-Feed Analytic Data Warehouses

Take yourself back in time to what was happening in the IT markets during the late 2000’s you will recall the rise of the data warehouse appliance. Vendors such as Teradata, Netezza, Oracle, IBM, Microsoft, EMC, Hewlett Packard, etc. were all selling pre-engineered systems optimized for data warehouse and analytic use cases. This new level of optimization was great for reporting, but it placed a lot of strain on IT to support efficient ways of loading data into this new class of IT appliance.

Traditional ETL tools were fine for many use cases but the central problem was that for the most important IT applications, there was little capacity to support intensive bulk-extract jobs and not enough time in the day for more batch processing windows. Data replication to the rescue. Replication tools like GoldenGate extract data from change logs rather than SQL or bulk-APIs, this makes replication much less invasive on the application itself and can preserve the database performance that end-users want to maintain on the source applications.

So, the second expansionary phase of GoldenGate market growth was in supporting customers all over the world who needed to feed data to their data warehouses without affecting the performance of their applications – and a new generation of GoldenGate customers were born.

EVERYDAY MOMENTS BY GOLDENGATE

By the time you read this paper today, chances are that you have already generated several GoldenGate transactions in your daily life. Here are a few examples of everyday activities that create GoldenGate events behind the scenes:

Real Customer Examples

- Buy a latte from your favorite Seattle-based coffee shop
- Update your profile or job description on LinkedIn
- Stop by the grocery to buy milk or a quick snack
- Download that latest song that’s stuck in your brain
- Have your paycheck sent to you via Paychex or ADP
- Use a coupon that’s been printed for you directly at the cash register
- Pay for that recent splurge with your Paypal account
- Book a reservation on any of your favorite airlines
- Call into the call center of your mobile phone carrier (all US carriers and many from the rest of the world)
- Update your taxes on Quickbooks.com
- Browse the personalized offers from your mobile app (in many retail stores)
- Withdraw cash at an any ATM or your bank teller
- Buy a book, or anything else from your favorite online bookseller
- Change your plan with your cable or satellite provider
- Do some black Friday shopping at Macys.com
- Bid on an online auction at EBay.com
- Setup your smart home

You and your family are already benefiting from GoldenGate daily from the innovations that have been pioneered by this technology over the past 20 years. What will the next 20 years bring?
INNOVATION FOR THE NEXT 20 YEARS

The world today is a very different place than it was in the 1990’s, the vast majority of the industrialized world runs on software and depends on the Cloud. Networks and databases are still the lifeblood for most software applications, but we are now so much more interconnected from cloud-computing, web services, and real-time feeds that source data from the devices in our pockets, in our homes, cars and from the data centers of our employers.

It is this increasing dependence on data, the IT shift to Cloud, and the consumerization of business software which is today driving extraordinary innovation in the very core of GoldenGate technology.

Non-Relational Data Stores – SaaS, Big Data, Cloud etc.

Did you know that in the short amount of time since 2017 GoldenGate has added support for more new platforms than in all of the preceding 20 years combined? There has been a genuine explosion of new investment by Oracle to support a huge range of new technologies for GoldenGate. In fact, some of the most successful growth areas for GoldenGate have been in all the new kinds of data stores that are supported today.

Here’s a brief run-down of some exciting integrations that production customers are doing with GoldenGate these days:

<table>
<thead>
<tr>
<th>Stream transactions into Cloud and PaaS services:</th>
<th>Integrate to a wide range of Big Data technologies:</th>
<th>Capture real-time data from SaaS Applications:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amazon Kinesis</td>
<td>Apache Kafka</td>
<td>Fusion ERP SaaS (financial and ledger)</td>
</tr>
<tr>
<td>Amazon Redshift</td>
<td>Apache Hive</td>
<td>Oracle Retail Cloud SaaS (merchandising updates)</td>
</tr>
<tr>
<td>Amazon S3</td>
<td>Apache HDFS</td>
<td>Oracle Transportation Management SaaS (real-time logistics)</td>
</tr>
<tr>
<td>Amazon RDS</td>
<td>Apache HBase</td>
<td>Oracle Cloud at Customer (hosted applications)</td>
</tr>
<tr>
<td>Azure SQL</td>
<td>Apache Flume</td>
<td></td>
</tr>
<tr>
<td>Azure HDI</td>
<td>Apache Cassandra</td>
<td></td>
</tr>
<tr>
<td>Google Cloud</td>
<td>ElasticSearch</td>
<td></td>
</tr>
<tr>
<td>Oracle Database Cloud</td>
<td>MongoDB</td>
<td></td>
</tr>
<tr>
<td>Oracle Event Hub</td>
<td>Hortonworks</td>
<td></td>
</tr>
<tr>
<td>Oracle Object Store</td>
<td>Cloudera</td>
<td></td>
</tr>
<tr>
<td>Oracle Autonomous Data Warehouse Cloud</td>
<td>MapR</td>
<td></td>
</tr>
<tr>
<td>Oracle Autonomous Transaction Processing</td>
<td>Confluent</td>
<td></td>
</tr>
</tbody>
</table>

Figure 3: New generation of capabilities
For the entirety of GoldenGate’s first 20 years the software was almost exclusively focused on relational database (exceptions being File and JMS), but in the past few years Oracle has added exciting and unprecedented support for new Applications, Big Data and Cloud.

**Kernel Integration with Oracle Database**

Since 2008 Oracle has invested 1000’s of person-years into high speed APIs for transaction capture from the Oracle Database. Since Oracle Database 11.2.0.4 and higher, Oracle has specifically optimized high-speed log extracts for the GoldenGate technology. Correspondingly the core database flag, "ENABLE_GOLDENGATE_REPLICATION" must be set to "TRUE" in order to leverage the high-speed extract capabilities of the Oracle Database.

In the beginning, this API investment mainly applied to the GoldenGate Integrated Capture feature, which is an innovative shift to improve GoldenGate specific log extracts. Over time, more and more high-speed integrations have been added for faster database writes, automated parallelism, and externalizing the transaction dependency calculations for even more optimizations.

As a commitment to open APIs, anyone may use the Oracle XStream APIs for high-speed logging in or out of the Oracle DB, but this capability does require the "ENABLE_GOLDENGATE_REPLICATION" flag to be set (and a corresponding license or subscription to GoldenGate). The XStream APIs go far beyond older Logminer utility in both their performance and reliability.

Customer demand for real-time replication is increasing at an unprecedented rate and that is why there are now private database APIs available only to GoldenGate. We are now optimizing the database kernel itself to parallelize and eliminate buffer latency for transactions flowing through the GoldenGate distribution services. In Oracle database 19.1 and higher, there are many low-level optimizations and innovations between the database and GoldenGate that many customers may not be aware of. A key goal for GoldenGate in each release is better performance. No other vendors come close to offering the depth and breadth of integration with the Oracle database.

On the Replicat side (for applying transactions) there is a new Parallel Replicat (Integrated Mode) process that provides an extremely fast, automated way of writing transactions into the database. Moving forward, this parallel processing environment will also serve as the foundation for high-speed writes into most supported data stores in the future.

<table>
<thead>
<tr>
<th>Replicat</th>
<th>Classic</th>
<th>Coordinated</th>
<th>Integrated</th>
<th>Parallel Non-integrated</th>
<th>Parallel Integrated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Batch Processing (BATCHSQL)</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Barrier Transactions</td>
<td>❌</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Dependency Computation</td>
<td>❌</td>
<td>❌</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Auto-Parallelism</td>
<td>❌</td>
<td>❌</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>DML Handler</td>
<td>❌</td>
<td>❌</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Auto-CDR</td>
<td>❌</td>
<td>❌</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Procedural Replication</td>
<td>❌</td>
<td>❌</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Dependency aware Transaction Split</td>
<td>❌</td>
<td>❌</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Cross-RAC-node processing</td>
<td>❌</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
</tbody>
</table>

*Figure 4: New generation of integrated features*

We anticipate that the world’s most extreme workloads for relational databases (on Oracle Database, of course) will generate upwards to 2+ TB/hr of redo log activity into the replication frameworks. With the many kernel innovations happening in GoldenGate, there may be no limits to what is possible in the data replication tier – only Oracle is investing and innovating at this depth!
Remote Capture on Non-Oracle Databases and NoSQL

The GoldenGate platform did not achieve market dominance because it was exclusive to Oracle. The DNA of GoldenGate actually started with Tandem NonStop Databases, and GoldenGate itself has supported other databases like Microsoft SQL Server and IBM DB2 for just as long as Oracle Database. Over the past 20 years, GoldenGate has had an unparalleled track record for world class support of non-Oracle databases.

Moving forward there is a whole new generation of non-Oracle database support in the works. Since 2017 a popular new pattern for utilizing replication technology aims to operate GoldenGate from mid-tier servers while remotely connecting to the data stores.

For some platforms like DB2 for z/OS mainframe systems, the off-host installation of GoldenGate is a meaningful reduction in MIPS (Millions of Instructions per Second) costs. For other platforms such as SQL Server, MySQL and DB2 for iSeries the primary benefit is in simplifying the administration of GoldenGate itself. Some customers have very large numbers of databases to replicate; and managing GoldenGate on each and every database host system is not practical at scale. Therefore, the remote connectivity and mid-tier deployment options can significantly reduce operational costs of the overall solution at very large, or even at very small scale.

Simplification, Automation, and Self-Service

For the vast majority of GoldenGate’s first 20 years of existence, the engineering and development priorities focused on making GoldenGate a rock-solid technology for disaster recovery and high availability solutions. Customers literally ran their businesses on the Service Level Agreements (SLAs) that GoldenGate provided to guarantee online availability of their transaction systems.

This focus on reliability and performance came at a cost of beautification; the user interfaces for GoldenGate over the years were mainly Command Line Interfaces (CLIs) and low-level control files (eg; Parameter Files) suitable for DBAs and developers. Over the years there were many competitors who came along that were more beautiful on the surface but couldn’t match GoldenGate performance or reliability, and GoldenGate still thrived.

Starting with the milestone release of GoldenGate 12.3 there are a whole collection of new capabilities specifically targeted at simplifying GoldenGate, making it more automated and user-friendly for non-DBA users to be productive with the platform. Simplification is beautiful!

Here are a few of the ways things are getting simpler for GoldenGate customers:

- Browser-based user experience for administration of GG components
- Automation in GG Core: auto-config, auto-sharding, auto-C DR (conflict detection)
- REST-based APIs for simple remote control over HTTP protocol
- Container-based options for zero-install deployment of GG
- Open framework for monitoring GG with open-source tools
• Cloud-native GG for just replication and broader data integration services
• Subscription-based agreements for low-cost or temporary use of GG

We have now begun an entirely new era where data replication customers can get Ferrari-level performance, Toyota-level reliability, with a rideshare Lyft-style subscription service all in one package - Oracle GoldenGate makes this possible right now.

Microservices Foundation
At the heart of GoldenGate’s new DNA is a microservices foundation. When we began this innovative reconceptualization of the GoldenGate core architecture back in 2016 the term “microservices” wasn’t even in the mainstream lingo of IT; we just called it a Service Component Architecture at the time.

GoldenGate has always been the most modular replication software in the market, and the logical next step was to make each modular component a discrete and standalone building-block that could interact with other services independently. Administration, Distribution and Metrics collection are now provided with new REST native microservices - each with their own embedded lightweight webserver so that secure API calls can be invoked directly on the services.

This new HTTP/REST driven paradigm for controlling GoldenGate is a sea-change for simplifying deployments, improving security (eg; leveraging Nginx for reverse proxy), and making globally distributed cloud deployments a snap. Other vendors have “wrapped” their older components with REST APIs without any underlying change in administration patterns. With GoldenGate 12.3 microservices, the whole approach was refactored from the ground-up.

GoldenGate customers are the only replication customers who run 1000’s of processes, moving Petabytes of data, and relying on the fault-tolerant zero-downtime characteristics of the platform for high resiliency mission-critical applications. This vast experience and know-how puts the GoldenGate engineering team in the unique position of providing a solution that is a class-above the rest.

Containers, Kubernetes and Docker
Arguably one of the most profound technology shifts to affect the enterprise software industry in recent years has been the shift to run applications in software containers. Docker is a type of software container that lets you pre-configure complex application software within an easy to deploy and modularized component that can be shipped to host platform as a single package. No traditional software installation is required. Kubernetes is a container orchestration system meant to coordinate two or more Docker containers at enterprise scale.

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Figure 6: Microservice architecture changes the paradigm for replication tools
GoldenGate deployments can easily take advantage of these two new technologies and they can simplify the setup and administration of even moderately sized deployments. In fact, Oracle has already made pre-built Docker containers available for GoldenGate:

- Oracle Docker Containers (all): https://github.com/oracle/docker-images
- Oracle GoldenGate Docker Container: https://github.com/oracle/docker-images/tree/master/OracleGoldenGate

Try this container now to get an idea of just how easy it can be to get started with GoldenGate.

**Simplified, Open Monitor Framework**

In the classic architecture of GoldenGate it can be challenging to effectively monitor in large deployments. Any distributed software deployment can have this challenge with monitoring. Since GoldenGate itself is an agent-based architecture that may have 100’s or even 1000’s of installations on different host servers all over the world, receiving a real-time comprehensive view into such large and distributed deployments is no easy feat.

The new GoldenGate microservices architecture aims to dramatically simplify one aspect of monitoring – accessing the metrics. There is a new microservice in GoldenGate called the GoldenGate Metrics Service. This Metrics service provides real-time monitoring via RESTful APIs and lightweight local database for storing up to 1 year of metrics for that service.

![Figure 7: New generation of monitoring capabilities on GoldenGate](image)

Openness is crucial and any GoldenGate customer can begin to leverage open monitoring frameworks (such as the ELK stack: ElasticSearch, Logstash, Kibana) for monitoring GoldenGate at scale. In fact, Oracle has published a pre-built example of using ELK on Docker to monitor GoldenGate via the Metrics service, you can find it here: http://www.oracle.com/technetwork/middleware/goldengate/oracle-goldengate-exchange-3805527.html
As you would expect, Oracle also provides world-class monitoring of GoldenGate via Enterprise Manager Plug-ins and the Oracle Management Cloud (https://cloud.oracle.com/management). These Oracle-based options are clearly the superior choice (for an integrated view) when GoldenGate is mainly being used alongside other Oracle software components.

**Stream Processing & Stream Analytics**

During the vast majority of the first 20 years of data replication, the focus was very narrowly defined on the capture and movement of data events. Technology like GoldenGate is now so optimized that we can usually see database transactions (and other database events) anywhere in the world with very low latency or transaction lag. What if we were to combine database events from all enterprise data stores in a single event stream, process and correlate the transactions, then guide data analysts to take business actions through a friendly user interface?

In the old days of Complex Event Processing (CEP) the events came principally from the application mid-tier APIs. In the Internet of Things (IoT) domain we usually think of events coming from devices like phones, cars or even toasters. But in the enterprise IT context, most of interesting data events come from application databases. What if we could easily scale out to handle every database in a company? That is what Oracle has done with Oracle Stream Analytics (OSA).

*Oracle Stream Analytics (OSA) is included for free with GoldenGate for Big Data, and the License covers an unlimited amount of source databases streaming events into OSA via GoldenGate.*

The underlying platform for Oracle Stream Analytics leverages Apache Kafka for ingest of data streams, and Apache Spark Streaming for processing the events in real-time streams. Even on modestly sized systems of a single node, this type of “Kappa” architecture can scale to 20,000+ transactions per second and because the architecture is modular it can horizontally scale to 1000’s of concurrent nodes. There are GoldenGate customers in production who move Petabytes of data into Apache Kafka on a daily basis.
With the inclusion of the streaming analytics capability, the GoldenGate platform moves well beyond a simple data replication tool and more into a fully-featured event processing platform that customers can use for solving both IT and Business problems. As seen in Figure 10, the Oracle Stream Analytics platform literally makes this as simple as point-and-click from your favorite web browser.
Customers from all over the world and all industries have taken advantage of GoldenGate for Big Data and Oracle Stream Analytics to solve real-world use cases such as:

- Fraud Detection
- Mobile Banking (marketing)
- Smart City (device IoT)
- Logistics (vehicle & container tracking)
- Retail marketing
- Smart metering (utilities)

**Autonomous Cloud**

Perhaps the most transformational shift at Oracle in the past three decades has been the company shift to cloud computing. Everything from the ERP applications, the Database and everything in the middle have shifted to a cloud-native and autonomous mode of operations. GoldenGate has been an instrumental aspect of this change. Behind the scenes GoldenGate actually helps provide much of the resiliency of Oracle’s SaaS applications and the cloud platform itself. But the most visible aspect of GoldenGate in the Oracle Cloud is what our customers can do with the two services:

- **GoldenGate Cloud Service** – for hosted, customer-managed use of GoldenGate
- **Data Integration Platform Cloud** – for a holistic platform that supports using GoldenGate on-premise, Oracle Cloud, Cloud@Customer, or in any other non-Oracle cloud

Data Integration Platform Cloud (DIPC) is an extremely innovative use of GoldenGate because it provides a downloadable DIPC Agent that includes GoldenGate, can support any typical GoldenGate use cases, and can install into a wide range of host configurations.

_The power of this approach is that customers may utilize GoldenGate just like Microsoft customers use Office 365 – a simple cloud subscription grants the ability to install and run GoldenGate anywhere._

Importantly, as with standard GoldenGate, the end-points of the data replication can be setup in the most optimal networks – it is not required to move data through any Oracle networks at all. This can simplify the performance, latency and security elements of the deployed solution.

In principle, if any of the data stores or applications are already in the Oracle cloud networks, the data should flow through Oracle anyway. However, if a customer wants to use the DIPC Agent (GoldenGate) to support a data flow from an on-premise datacenter to an Amazon datacenter; this can be setup with a direct connection and no data routing needs to involve Oracle networks at all.

*Figure 11: Data Integration Platform Cloud (DIPC) makes it easy to use GoldenGate*
The autonomous nature of the Data Integration Platform Cloud (DIPC) means that you can operate GoldenGate as if it were a hosted SaaS application – Oracle will take care of patching, upgrades, metering, monitoring and even many software optimizations. For example, there is an entirely new user experience in DIPC called the Replication Task. The Replication Task makes it super-simple to define your Source and Target data stores and start replicating data. Likewise, the Sync Data task can even perform the initial data instantiation, set correct checkpoints, and start the replication with zero loss of data or complex, manual DBA processes required.

These points help show why the shift to a cloud-native platform provides many opportunities to streamline and simplify GoldenGate for our customers. But one of the most compelling reasons to consider cloud isn’t the simplified experience, it’s all about the money!

**Low Cost (Pay As You Go) Subscriptions**

Probably the most persistent and misunderstood rumor about GoldenGate over the years has been that it is expensive. In fact, the GoldenGate price has changed just once since acquisition in 2009 despite more than 1000 person-years of new development in the same period. Also, unlike most vendors, the Oracle pricelist is a public document and may be found here: [https://www.oracle.com/corporate/pricing/](https://www.oracle.com/corporate/pricing/).

For typical GoldenGate use cases this established pricing has been very fair and effective since historically many customers operate GoldenGate in mission-critical situations (such as online applications for disaster recovery) and the cost of GoldenGate software is fractional compared to the overall cost of making an application available 99.99% of the time. When seen as part of a business continuity solution (which other data replication vendors typically don’t cover) the license cost of the GoldenGate software is quite small.

However, as the popularity of data replication has risen for offline use cases (such as Data Warehouse, Data Lakes, and Data Migrations) the number of GoldenGate deployments on the source data stores have risen exponentially – customers typically want software subscriptions to cover solutions that are temporary, very large or highly variable. Thus, the most popular new pricing for GoldenGate at Oracle is with the new Data Integration Platform Cloud (DIPC) and GoldenGate Cloud Service (GGCS) subscriptions, which start at less than $0.99/hr for a GB of streaming data.

**GoldenGate cloud subscriptions start at less than $0.99 per hour**

This new low-cost DIPC-Enterprise subscription includes all the features of GoldenGate (for Oracle, Big Data and most Non-Oracle Databases), and also includes ETL features of Oracle Data Integrator, and all the capabilities of Oracle Stream Analytics. In many situations (eg; for Data Migrations and Data Lakes) this new subscription service can provide a much more effective Total Cost of Ownership (TCO) when compared the traditional perpetual licenses.
CONCLUSION

GoldenGate has been one of the most popular and widely used enterprise software tools of the past two decades and has been one of the most successful integration tools ever. While the past 20 years have brought tremendous success for the platform, the latest GoldenGate software has already pivoted towards new innovations which will ensure ongoing relevancy and dominance in the next 20 years.

Try to imagine a future where it is acceptable for business applications to have more downtime or where it is acceptable to do analytics on stale data – it’s not going to happen. The future will bring even more intense demands on application up-time, and even more focus on providing analytics using up-to-the-moment data. Data replication capabilities will be more relevant in the future, not less.

Data replication capabilities will be more relevant in the future, not less.

Oracle is investing to ensure that GoldenGate is easier and more cost-effective to use for any use case; these new investments include:

❖ Non-Relational Data Support - for SaaS Applications, Big Data, and Cloud
❖ Kernel Integration with Oracle Database - far better performance than any other vendor
❖ Remote Capture for Non-Oracle Databases - reduced workloads and simpler admin
❖ Simplification, Automation and Self-Service - no need for DBAs with most actions
❖ Microservices Core Foundation - more secure, more modular, and easier to work with
❖ Simplified, Open Framework for Monitoring - more choices for DevOps
❖ Containers, Kubernetes and Docker - faster and easier to deploy GoldenGate
❖ Stream Processing and Stream Analytics - added value with event processing
❖ Autonomous Cloud - let Oracle Cloud do the patching and optimizing for you
❖ Low-Cost (Pay-Go) Subscriptions - start using GoldenGate for the cost of a cup of coffee

We are at an exciting intersection for the development of GoldenGate, Cloud and for Data Integration as a whole. Oracle is at the forefront of this technology innovation that is empowering customers all over the world to re-imagine what they can do for their Data Warehouses, Data Marts, Data Lakes and Database infrastructure!

For more information about Data Integration Platform Cloud: