Oracle GoldenGate 路线图和策略

公益讲座11：00准时开始，请大家先浏览云技术微信公众号技术文章。资料会在各群同步发布，已入群客户请勿重复入群！

20-22

数据库和云讲座群

甲骨文云技术公众号

B站专家系列课程

基于 **Oracle** 数据库
免费企业数据健康检查

- 及时了解数据库健康状况，发现并解决潜在问题
- 维护数据库系统良好状态，保护数据资产的安全
- 提升数据库性能、稳定性和安全性，降低业务风险

免费咨询热线：

400-699-8888

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Oracle GoldenGate 路线图和策略

演讲者 Speaker:
周俊 Gene Zhou,
资深技术顾问

Safe harbor statement

The following is intended to outline our general product direction. It is intended for information purposes only, and may not be incorporated into any contract. It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decisions. The development, release, timing, and pricing of any features or functionality described for Oracle's products may change and remains at the sole discretion of Oracle Corporation.

议程
Packed agenda for today:

1. GoldenGate 路线图的投资重点
   Investment Priorities for GoldenGate Roadmap
   -- 未来 1-3 年的发展思路是什么
   what is development thinking about for next 1-3yrs

2. GoldenGate 未来 18 个月的路线图
   GoldenGate Roadmap for the next 18month
   --上个月在 CloudWorld 上发布的 OGG 公告。
   GG announcements happening in CloudWorld last month

3. GoldenGate V23 新功能
   GoldenGate V23 New Features

数据管理的战略性、宏观主题
Strategic, big-picture topics for data management

生成式AI、机器学习和自然语言的影响
Impact of generative AI, machine learning and natural language
- 随着时间的推移，平台更加智能、自动化程度更高、投资回报率更快、质量更好
  More intelligence in the platform, more automation, faster ROI, better quality over time

数据编织、数据网格 Data Fabrics, Data Mesh
- 统一数据平台、数据语义、联合治理等。Unified data platform, data semantics, federated governance etc.

数据产品 Data Products
- 数据收集、流式 API、分析和数据科学产品
  Data collections, streaming APIs, analytics and data science products

分布式、多云 Distributed, Multi-Cloud
- 去中心化数据平台和数据产品
  Decentralized data platforms and data products

实时流数据 Real-time, Streaming Data
- 企业领导者需要更快的
  SLA Business leaders demand faster SLAs

GoldenGate 的战略方向
Strategic direction for GoldenGate

作为实时流式数据编织的第一平台，持续保持领先地位——帮助客户自动部署用于运营应用程序、数据中心/网格、分析和数据科学解决方案的高影响力、可信数据产品。 Ongoing leadership as #1 platform for real-time, streaming data fabric – helping customers automate deployment of high-impact, trusted data products for operational applications, data hubs/mesh, analytics and data science solutions.

实时流式数据编织和数据网格的统一平台 Unifying platform for real-time, streaming data fabrics and data mesh
- 工作流程模式、生成式 AI、ML 和数据语义，实现极致自动化和简化 Workflow patterns, generative AI, ML and data semantics for extreme automation & simplification

多云和分布式架构 Multi-cloud and distributed architectures
- 针对数据重心所在的位置进行优化 Optimized for wherever your center of data gravity is

以数据为中心 Data Product Centric
- 流式数据生产者/消费者的最佳工具 Best tool for streaming data producers/consumer

应用、运营和分析 Applications, Operations and Analytics
- 整个数据生态系统的实时数据解决方案
  Real-time data solutions for the whole data ecosystem

经济高效的开放式工具 Cost-effective, open tooling
- 免费且低成本的选项，可与数千种工具配合使用 Free and low-cost options, works with 1000's of tools

ORACLE | GoldenGate

GoldenGate 发展方向 GoldenGate Road Ahead...

GoldenGate 23c Free

OCI GoldenGate

持续更新，通常每周/每月一次
Ongoing updates, typically on a weekly/monthly basis

用于分布式应用程序和分析的 GoldenGate GoldenGate for Distributed Applications and Analytics

最新一代 GoldenGate 适用于所有应用程序和大数据功能 Newest generation for all apps and big data capabilities in GoldenGate

GoldenGate 23c

重大更新，长期版本！
Major updates, long term release!

weekly/monthly

GG 23c for other platforms

大数据、非 Oracle DB、基础套件、Veridata 和非主流操作系统

GG Big data, non-Oracle DBs, Foundation Suite, Veridata and second-tier operating systems

Oracle GoldenGate

最值得信赖的数据集成解决方案
the most trusted solution for data integration

ORACLE | GoldenGate

1000's 个用户
of customers

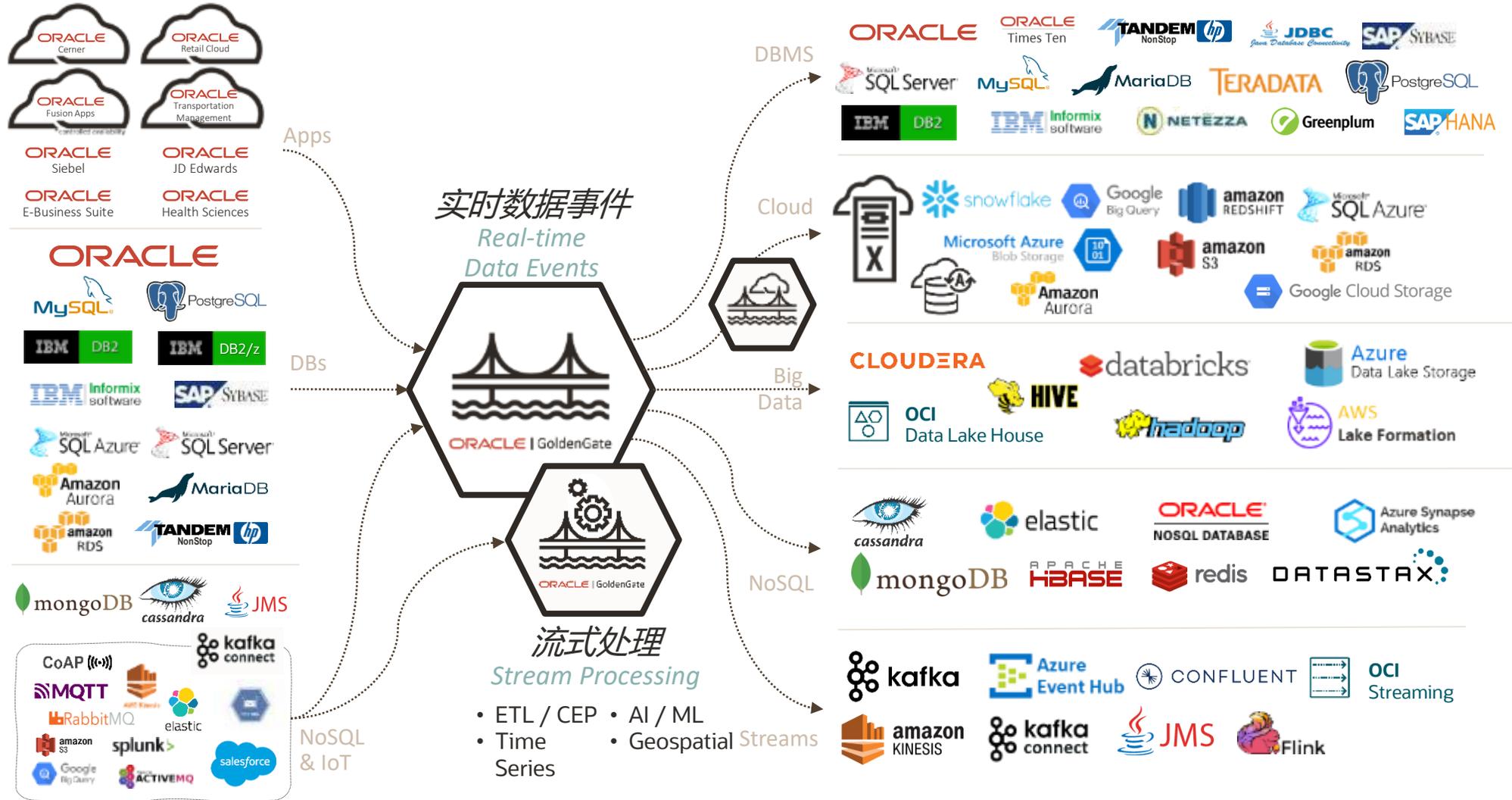## 84% 的财富 100 强企业使用
of Fortune 100 use GoldenGate

#1 实时数据和数据编织策略
in real-time data & Data Fabric Strategy

支持的数据平台超过 1000 种组合
1000+ combinations of supported data platforms

OGG对Oracle与MySQL和PostgreSQL之间数据同步的支持
OGG support for data synchronization between Oracle and MySQL and PostgreSQL

MySQL ← OGG V21c → Oracle ← OGG V21c → PostgreSQL

- ❑ OCI MySQL
- ❑ Aurora MySQL 5.7/8.0
- ❑ Amazon RDS MariaDB 10.4/10.5
- ❑ Amazon RDS MySQL 5.7/8.0
- ❑ Azure MySQL 5.7/8.0
- ❑ Google GCP MySQL 8.0
- ❑ MariaDB 10.4-10.9
- ❑ SingleStoreDB 7.8/8.0 (Apply only)
- ❑ SingleStoreDB Cloud 7.9 (Apply only)

- ❑ Aurora PostgreSQL 10-13
- ❑ Amazon RDS PostgreSQL 11-14
- ❑ Azure Cosmos DB 11-15 (Apply only)
- ❑ Azure PostgreSQL 10-13
- ❑ Google GCP PostgreSQL 10-14
- ❑ PostgreSQL 10-15

GoldenGate 用于大数据
GoldenGate for Big Data

ORACLE

MySQL · PostgreSQL
IBM DB2 · IBM DB2/z
IBM Informix · SAP SYBASE
Microsoft SQL Azure · Microsoft SQL Server
Amazon Aurora · TANDEM NonStop hp

JMS · cassandra

kafka connect

mongoDB · AWS Kinesis · elastic
RabbitMQ
amazon S3 · splunk> · salesforce
Google BigQuery · Apache ActiveMQ

ORACLE RETAIL CLOUD · ORACLE Hospitality Integration Cloud
ORACLE FUSION & APPLICATIONS · ORACLE JD EDWARDS
ORACLE SIEBEL
ORACLE HEALTH SCIENCES

✓ 数据摄取、流式 ETL、流式分析
Data Ingest, Streaming ETL, Stream Analytics

✓ 支持所有主要数据湖和云
Supports all major data lakes and clouds

✓ 受到运营全球最大 Kafka 和数据湖集群的客户的信赖
Trusted by customers that operate the largest Kafka and Data Lake clusters in the world
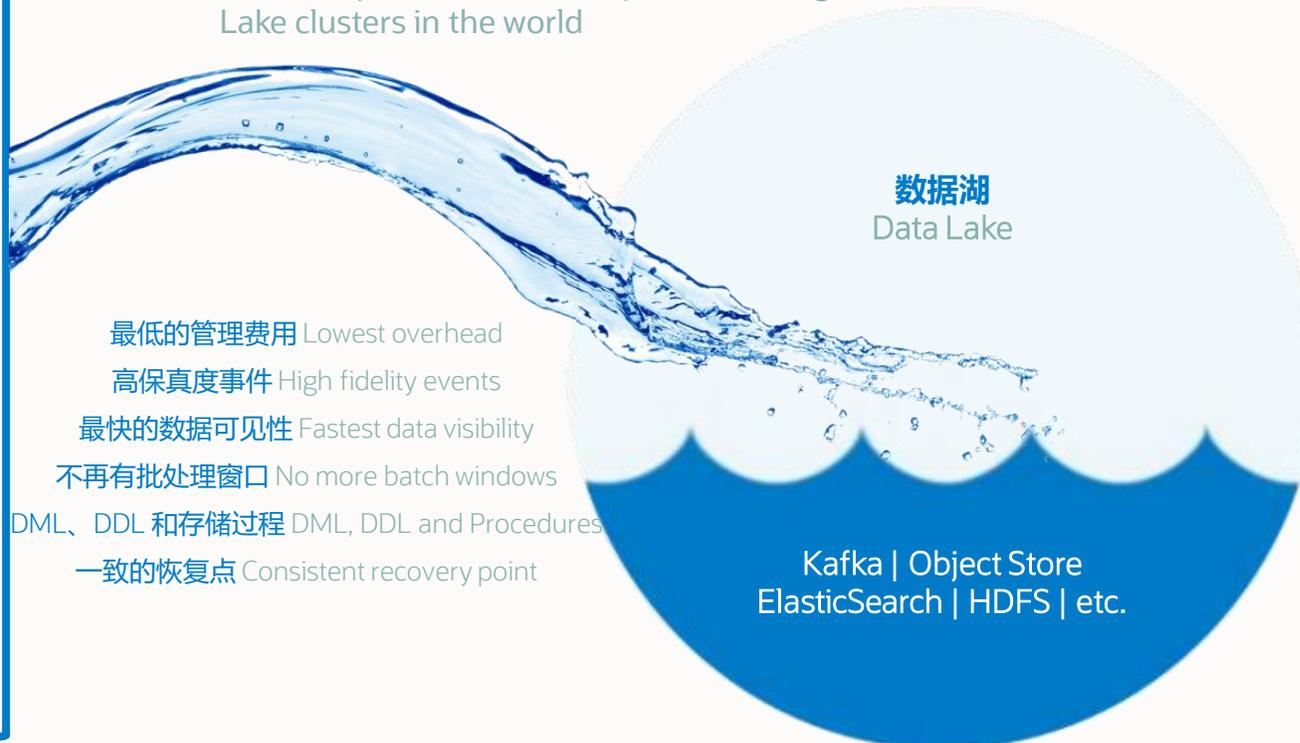
最低的管理费用 Lowest overhead
高保真度事件 High fidelity events
最快的数据可见性 Fastest data visibility
不再有批处理窗口 No more batch windows
DML、DDL 和存储过程 DML, DDL and Procedures
一致的恢复点 Consistent recovery point

数据湖
Data Lake

Kafka | Object Store
ElasticSearch | HDFS | etc.

相比于 Compare to:
- Sqoop 或 Kafka Connect 等开源工具 Open source tools like Sqoop or Kafka Connect
- 批处理 ETL 商业或开源 Batch ETL commercial or open source
- CDC 工具较弱，因为使用的 API 性能较差 Weak CDC Tools using poor performing APIs
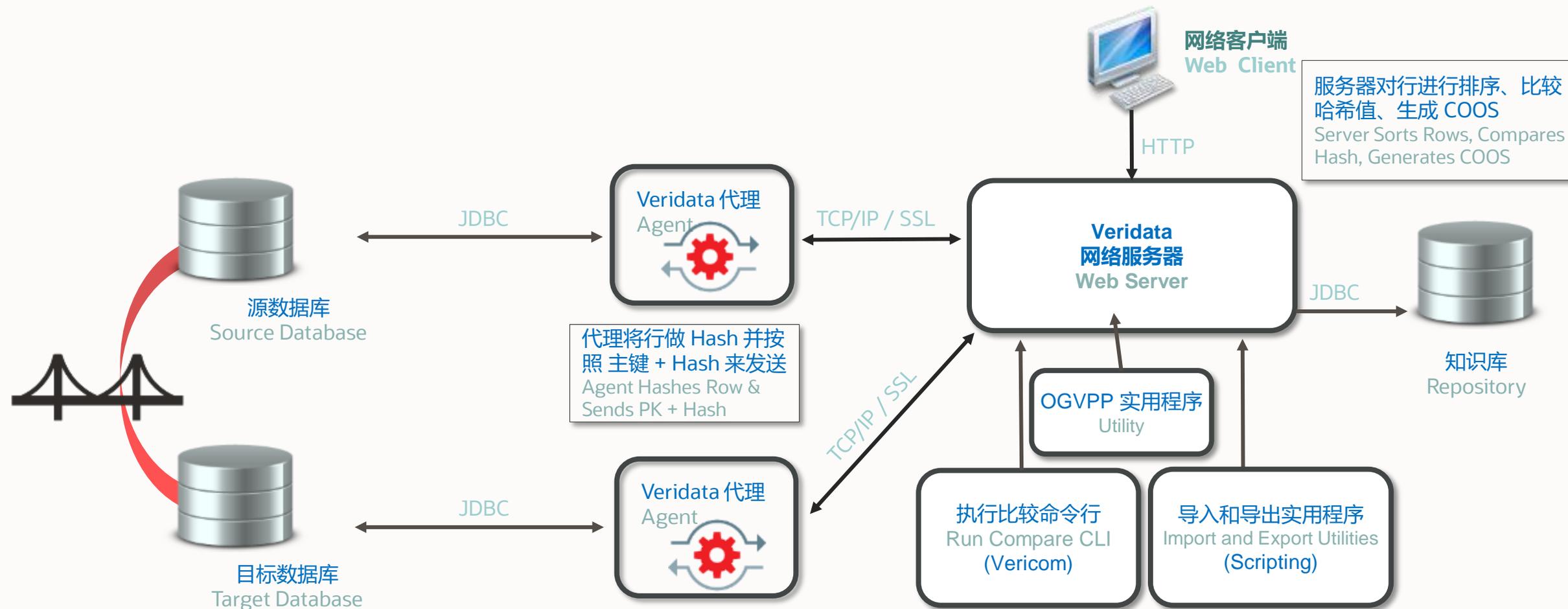- 锁定用户的专有云服务 Proprietary cloud-only services that lock-in users

GoldenGate is:
- 在任何地方/任何云上的**多云**环境运行 GG **Multi-cloud** run GG anywhere / any cloud
- 通过微服务、云等更**易于**使用 **Simpler** to use via microservices, cloud etc
- 在大多数数据库（尤其是 Oracle）上具有**更好的性能** **Better Performance** on most DBs, esp Oracle
- **更可靠**（在高可用性和灾难恢复情况下）**More Reliable** (in high availability and disaster recovery situations)
- **正确且值得信赖**的事务一致性最佳选择 **Correct & Trusted** best for transactional consistency

GoldenGate Veridata 架构
GoldenGate Veridata Architecture

网络客户端
Web Client

服务器对行进行排序、比较
哈希值、生成 COOS
Server Sorts Rows, Compares
Hash, Generates COOS

HTTP

源数据库
Source Database

JDBC

Veridata 代理
Agent

TCP/IP / SSL

**Veridata
网络服务器
Web Server**

JDBC

知识库
Repository

代理将行做 Hash 并按
照 主键 + Hash 来发送
Agent Hashes Row &
Sends PK + Hash

TCP/IP / SSL

OGVPP 实用程序
Utility

目标数据库
Target Database

JDBC

Veridata 代理
Agent

执行比较命令行
Run Compare CLI
(Vericom)

导入和导出实用程序
Import and Export Utilities
(Scripting)

GoldenGate Veridata：客户验证
GoldenGate Veridata: Customer Validation
确保数据准确一致 Ensures Accurate and Consistent Data

- 汤森路透是全球领先的企业和专业人士智能信息提供商。
  Thomson Reuters is World's leading provider of intelligent information for businesses and professionals.

- 汤森路透希望确保旗舰产品 Westlaw 的数据完整性，以确保用户获得最新且准确的信息。
  Thomson Reuters wants to ensure data integrity for the flagship Westlaw to ensure users obtain up-to-date and accurate information.

- 汤森路透通过消除手动复制数据、减少错误并提高客户满意度来提高系统可用性。
  Thomson Reuters improved system availability by eliminating manual copying of data, reduced errors, and improved customer satisfaction.

- **"Oracle GoldenGate Veridata 有助于帮助我们确保在多主机、多数据库生产环境中拥有准确的数据，这可以提高用户的信心。"**
  "Oracle GoldenGate Veridata is instrumental in helping us to ensure that we have accurate data across our multimaster, multidatabase production environment—which translates to a high level of user confidence."
  Dan Paczosa，首席数据库工程师， 法律、技术、基础设施和运营
  Dan Paczosa, Lead Database Engineer, Legal, Technology, Infrastructure and Operations

Ref: https://www.oracle.com/a/ocom/docs/goldengate-veridata-ensuring-data-consistency.pdf

GoldenGate 23c Free

现在<u>每个人</u>都可以利用世界上最流行的实时数据集成软件！
<u>Everyone</u> can now take advantage of the world's most popular real-time data integration software!

100%免费，没有任何问题！ 100% free, no catch!
- 适用于任何环境
  Use for any/all environments
- 非常适合试验和学习
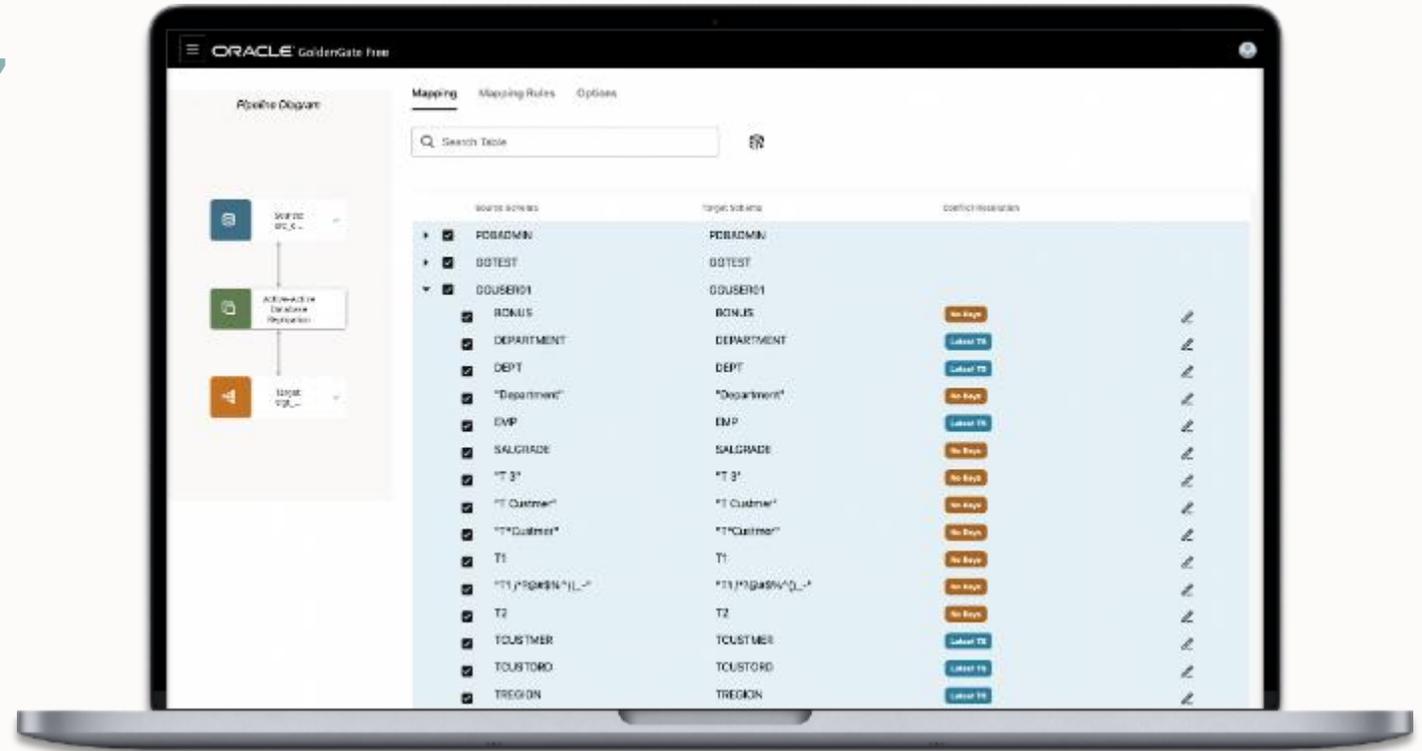 Ideal for trials and education
- 许可证永不过期 License never expires

现在 23c 已可用 Now 23c ready
- 适用于 Oracle DB 23c（最大 20GB）
  Works with Oracle DB 23c *(up to 20GB size)*
- 运行 GoldenGate 23c
  Runs GoldenGate 23c

新的简化用户界面
New simple user interface
- 自动化、易于使用的方法
  Automated, easy to use recipes
- 单向和双向 Uni-directional & Bi-directional

ORACLE
GoldenGate 23c

简化的 99.999% 最大可用性
Simplified 99.999% max availability
- 去除对 DBFS 和 ACFS 的依赖
- 观察者/集群生命周期控制内置微服务代理更加灵活

数据流（AsyncAPI）
Data streams (AsyncAPI)
- 创建和发布流数据频道
- 带有 JSON 的 AsyncAPI REST API
- "数据生产者和消费者"的发布/订阅交互模型
- 更高效的事件溯源微服务设计模式

可观察性和可诊断性
Observability & diagnosability
- StatsD 和 Telegraf 集成以处理、聚合和输出 GG 遥测数据
- 自动工作负载存储库（AWR）功能增强
- OGG 微服务的集成健康检查和警报应用和捕获
- 对数据库中的应用和捕获流程集成了诊断和故障排除功能

数据库 23c 支持 Database 23c support
- 数百个新特性和功能
- 例如：自动冲突检测增强、向量、区块链、无锁可保留列等。

自助服务用户体验 Self-service user experience
- 简化、更直观、反应灵敏的 GUI
- 新的 Web Studio，可在 OGG 23c 免费版中使用

使用 EBR 在线应用程序升级 Online app upgrades w/EBR
- 基于版本重定义 (EBR) 的在线 DDL
- 对于电子商务套件和其他应用程序很重要

安全与治理 Security & governance
- 利用 OCI 身份域的 SSO（还有更多！）
- 通过 FedRAMP"网闸"二极管进行解码/编码
- Veridata 微服务、Java Helidon 等
- 适用于云/本地的新 Veridata Web Studio
- 与更多数据目录工具集成

性能、弹性和易用性 Performance, resilience & ease of Use
- 增强、更快的并行复制应用程序
- 快速故障检测和自动重新连接

更多源和目标 More sources & targets
- 新的 Azure、AWS、GCP 数据存储
- 新的湖仓数据/交易支持

针对AI/LLM 向量嵌入的流式插入
Streaming inserts on AI/LLM vector embeddings
为 LLM/GPT 企业解决方案带来获取实时数据变化的功能
Capabilities that bring real-time data changes to LLM/GPT enterprise solutions
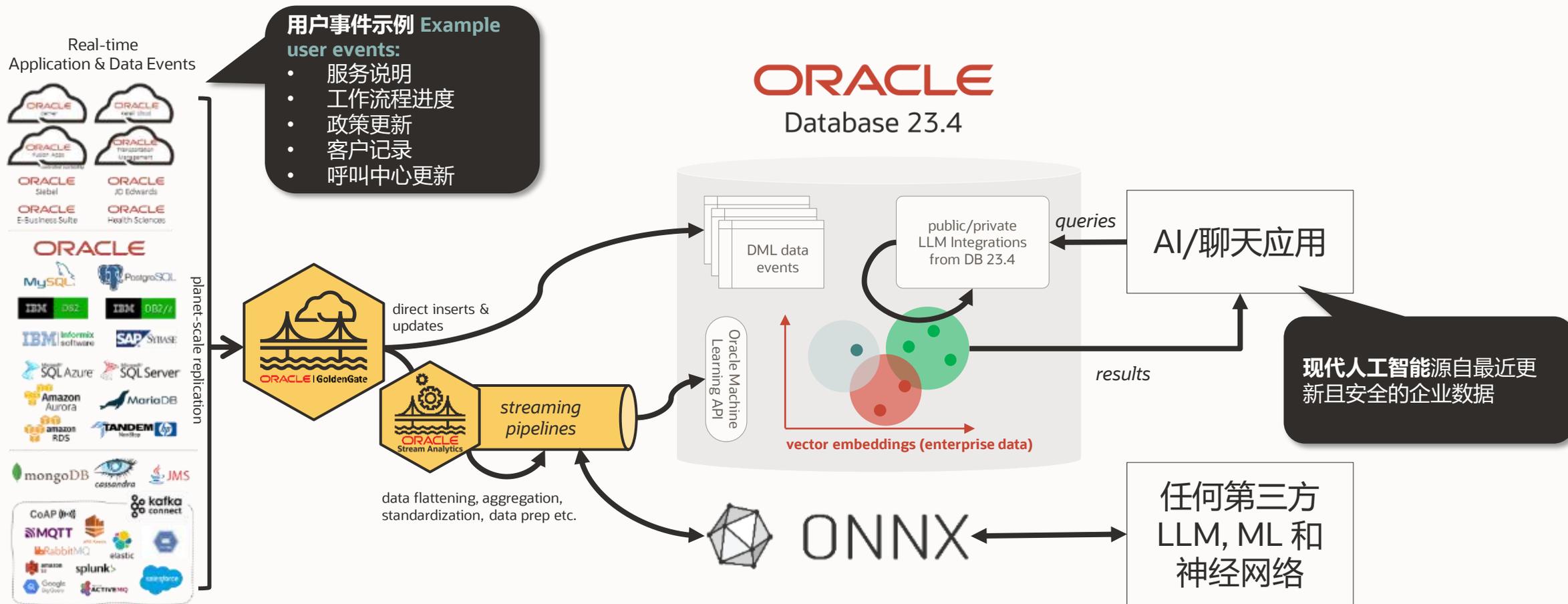
用于分布式应用程序和分析的新 GoldenGate
New GoldenGate for Distributed Applications and Analytics
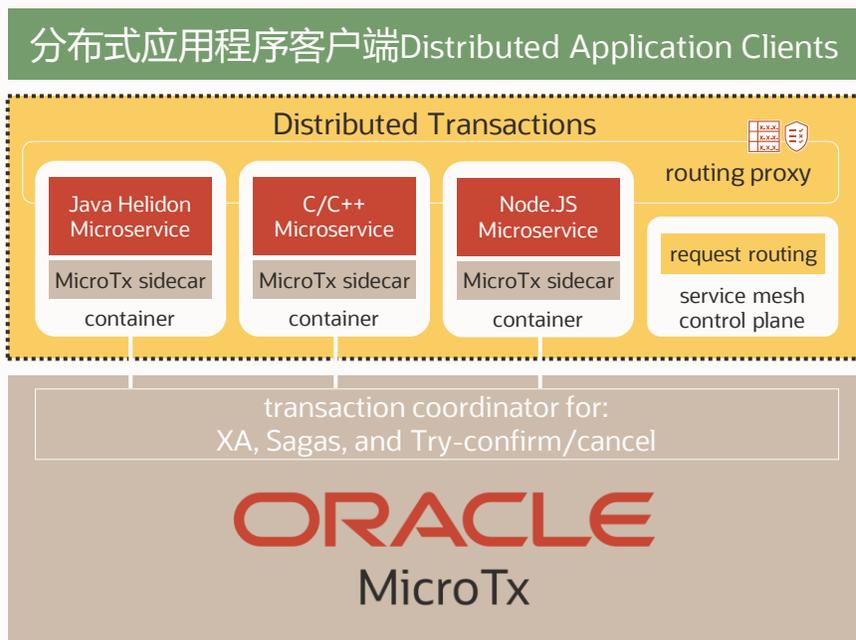### 为应用程序开发人员、数据工程师和数据消费者提供简化的单一包
Simplified, single package for application developers, data engineers and data consumers

用于分布式应用程序和分析的 GoldenGate
GoldenGate for Distributed Applications and Analytics

for Application Development

new product capabilities!

微服务 Tx 管理
microservices Tx management

new product capabilities!

数据流
data streams (asyncAPI)

for Stream Processing

流数据准备、管道+分析
streaming data prep, pipelines + analytics

for DBMSs
* separately priced products

GG for Oracle
GG for Non-Oracle
GG for Mainframes

for NoSQL

for Events & Messaging

捕获或交付交易+事件
capture or deliver transactions + events

for Big Data & Lakehouses

for Warehouses

传递数据交易+事件
deliver data transactions + events

微服务事务管理器企业版
Transaction Manager for Microservices Enterprise Edition

现在包含在 GoldenGate 分布式应用程序和分析产品包中！ Now included as part of the GoldenGate for Distributed Applications and Analytics product package!

分布式应用程序客户端Distributed Application Clients

Distributed Transactions

routing proxy

Java Helidon Microservice	C/C++ Microservice	Node.JS Microservice	request routing
MicroTx sidecar	MicroTx sidecar	MicroTx sidecar	service mesh control plane
container	container	container	

transaction coordinator for:
XA, Sagas, and Try-confirm/cancel

ORACLE
MicroTx

docker   kubernetes   Java   spring boot
node JS   helidon.io

✓ 适用于开发高数据一致性应用程序的应用程序开发人员的加速器

✓ 预构建的事务模式：两阶段/多阶段 (XA) 提交、尝试确认/取消 Tx、事件源/Saga 长时间运行的 Tx、同步或异步通信等。

✓ 多语言微服务支持：
- Java：在 Helidon、WebLogic Server、Spring Boot 中使用 Jax-RS，以及使用 Express.js 的 Typescript
- PL/SQL：使用 OAE 和 Oracle REST 数据服务
- C/C++/COBOL：在 Tuxedo 中运行 (REST-SALT)

✓ 利用区块链进行智能合约并部署到 K8S 和 Docker Swarm

GoldenGate 数据流
GoldenGate Data Streams

通过 "发布/订阅模式"的AsyncAPI接口为用户提供goldengate捕获到的JSON格式的数据变化信息

Real-time data events

New/Existing GG Deployments

ORACLE Data Streams

Standardized Pub/Sub APIs

YAML descriptor

Message

Data Tx's
- Inserts
- Updates
- Deletes
- GET/PUT
- Schema Changes
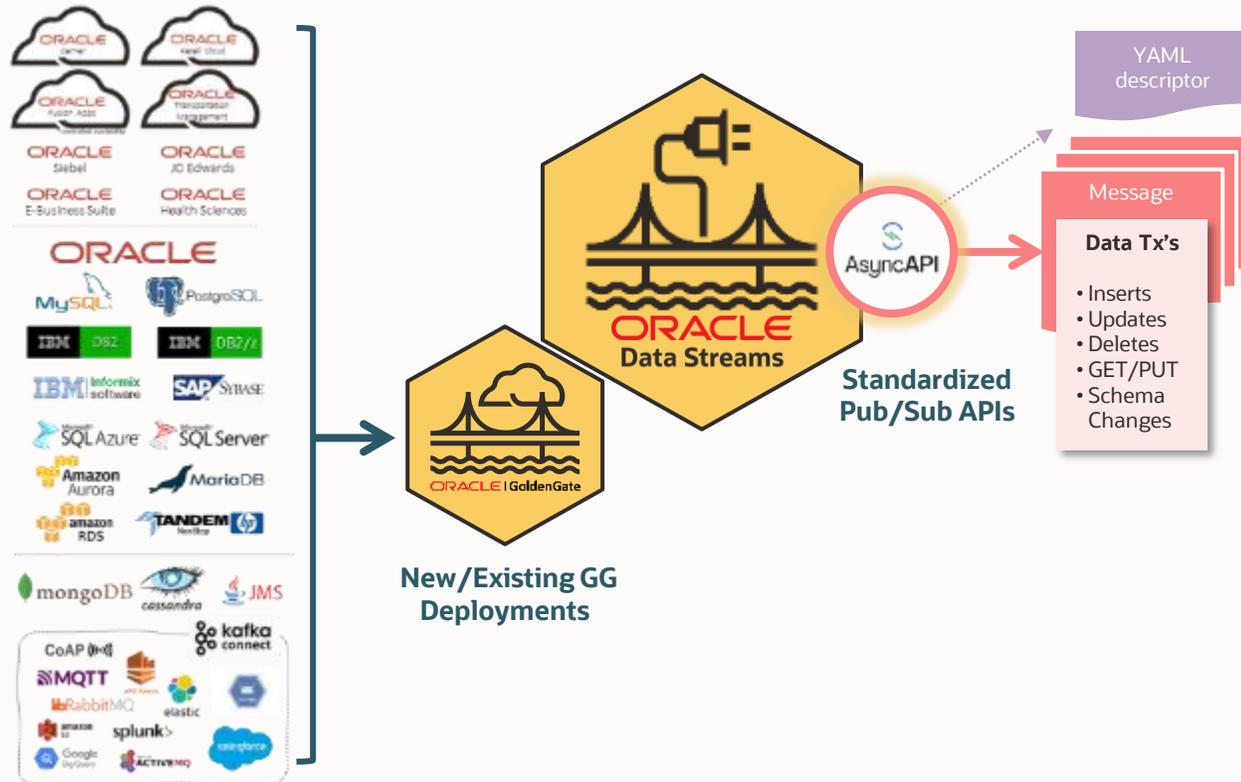
Benefits

✓ 向任何数据消费者提供实时数据事件

✓ 自动代码生成器：
python · node · Golang · Java · .NET

✓ 简单的事件源和交易发件箱模式

✓ 数据消费者无需使用 Kafka

✓ AsyncAPI 是事件驱动架构的未来

Veridata 23c 测试版发布
Veridata 23c Beta Launch

立即注册！ Sign up now!
- 请联系您的 Oracle 代表并请求参与此测试版的试用
  Contact your Oracle representative and ask to participate in this Beta

最佳比较修复工具 Best compare-repair tool
- 自动修复 Automatic repairs
- 适用于各种数据库 Works across various databases
- 为 DBA 生成 SQL Generate SQL for DBAs
- 内置报告 Built-in reporting

主要新功能 Major new capabilities
- 新的自助服务用户界面 New self-service user interface
- 基于浏览器，可远程访问 Browser-based, remotely accessible
- 高级作业监控 Advanced job monitoring

新的后端架构
New back-end architecture
- Java Helidon 微服务核心 Java Helidon microservices core
- 基于Agent的分布式服务 Agent-based distributed services
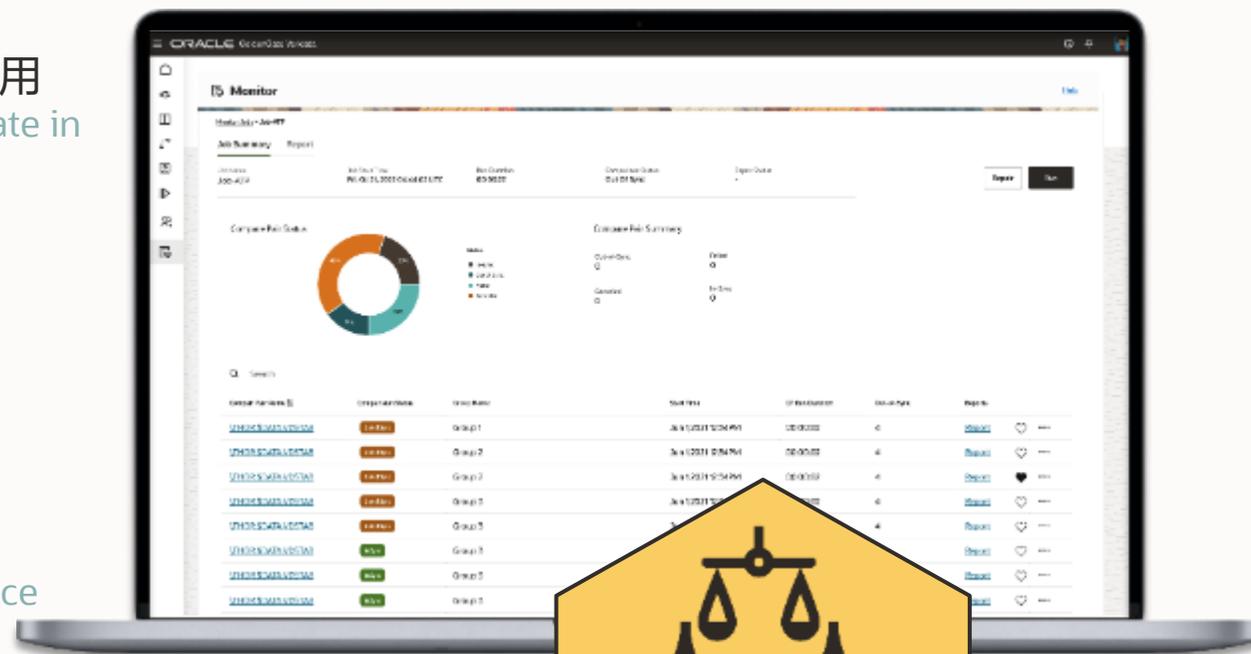
GoldenGate 23c – 新功能
GoldenGate 23c – New Features

性能可诊断性
Performance Diagnosability

- 适用于高活跃 OLTP 应用程序的增强型并行复制
  Enhanced Parallel Replicat for highly active OLTP applications

- 在 Windows 上使用命名管道代替网络套接字进行内部通信
  Use Named Pipes instead of network sockets for internal communication on Windows

- 自动工作负载存储库增强功能
  Automatic Workload Repository Enhancements

- 集成捕获和应用诊断
  Integrated Capture & Apply diagnostics

增强的功能
Enhanced Functionality

- 更新的外观/直观的导航
  Updated look-and-feel/ Intuitive navigation

- 简化的 GoldenGate 部署 (oggca.sh)
  Simplified GoldenGate Deployment (oggca.sh)

- 支持列映射到数据库函数（包括用户定义函数）
  Support column mapping to database functions (including user-defined functions)

- 轨迹文件管理
  Trail File Management

- 数据流
  Data Streaming

- 用于跟踪文件支持的气隙解决方案
  Air Gap Solution for Trail File support

安全特性
Security Features

- DB 23c 中的内置捕获和应用角色
  Built-in capture and apply roles in DB 23c

- GoldenGate 支持更长的数据库密码
  GoldenGate support for longer database passwords

- 使用 OCI 身份域对 GoldenGate 微服务进行单点登录支持
  Single-Sign-On support for GoldenGate microservice with OCI Identity Domains

- 通过支持 Oracle Key Vault 21.4 中的不可提取主密钥来强化跟踪文件加密
  Harden trail file encryption by supporting non-extractable master keys in Oracle Key Vault 21.4

弹性可用性
Resilience Availability

- GoldenGate和DGPDB的共存
  Coexistence of GoldenGate and DGPDB

- 支持GoldenGate与滚动升级共存
  Support coexistence of GoldenGate with Rolling Upgrades

- 自动重新连接以确保应用程序连续性
  Automatic reconnects for application continuity

- 分发和目标发起路径的快速故障检测
  Fast failure detection for distribution and target-initiated paths

GoldenGate 23c – 新功能
GoldenGate 23c – New Features

针对Oracle数据库
For Oracle Database

- 复制支持 Replication support for
  - ✓ 无锁预保留列 Lock-free reservable columns
  - ✓ 区块链和不可变表 Blockchain & Immutable Tables
  - ✓ 布尔数据类型 Boolean datatype
  - ✓ SQL 域 SQL Domains
  - ✓ 具有 4K 列的表 Tables with 4K columns
- 改进了复制部分 JSON 更新的性能 Improved performance for replicating partial JSON updates
- 与Telegraph和StatsD StatsD with Telegraph
- 数据流 Data Streaming
- 新的网页界面 New Web Interface

- 与新的 DDL 更改通知功能集成 Integration with new DDL change notification feature
- EBR – 在线应用程序升级 Online Application upgrades
  - ✓ 在存在 GG 复制时通过启用在线 DDL，支持使用 EBR 进行在线应用程序升级。 Support for online Application upgrades using EBR by enabling online DDL when GG replication is present.
  - ✓ 允许从应用程序提供数据，而不会影响应用程序在线打补丁 Allows data feeds from applications without compromising application online patching
- 自动 CDR 增强 支持在线重定义和模式演化 Automatic CDR enhancements Support for online redefinition and schema evolution
- 新的HA架构 New HA Architecture

核心功能
Core Functionality
—

AsyncAPI – 数据流 Data Streaming

行业首次，使用 AsyncAPI 的 CDC/Replication
Industry first, CDC/Replication using AsyncAPI

从 GoldenGate 分发服务器的Async API 分发，该 API 可以支持多种格式以便与其他产品集成。
发布/订阅模型。 Distribute from the GoldenGate Distribution Server an Async Streaming API that can support a variety of formats for integration with other products. Pub/Subscribe Model.

标准 AsyncAPI REST API，初步支持 JSON 和 AVRO 格式。
Standard AsyncAPI REST API with initial support for JSON and AVRO formats.

Streaming Data Products

Data Product Consumers
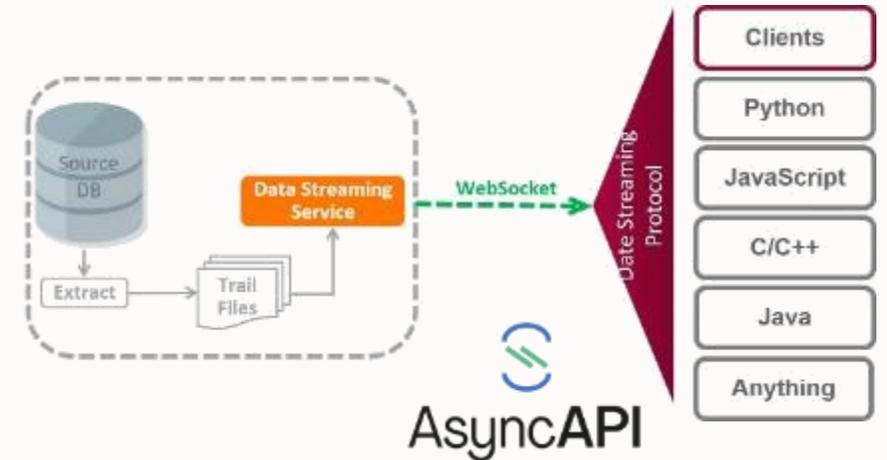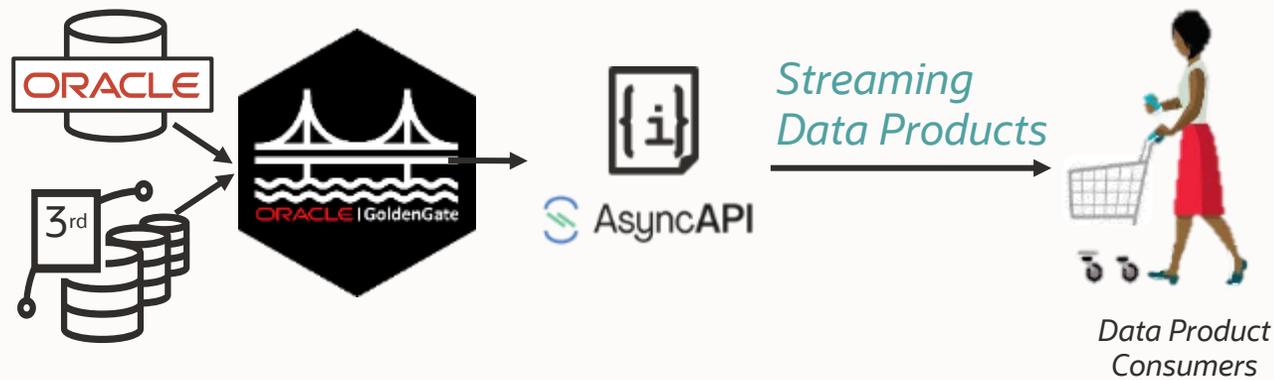
简化且更易于使用和导航的 WebUI
Simplified and easier to use and navigate WebUI

IN PROGRESS

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使用 EBR（基于版本的重定义）在线应用程序升级
Online Application upgrades using EBR (Edition Based Redefinition)

数据库解除在线DDL操作限制 Database lifted Restrictions on Online-DDL operations

✓ 具有补充日志记录的表在 Oracle 23c 中是非阻塞的 Tables with Supplemental Logging are NON-Blocking in Oracle Database 23c

基于版本的重新定义的好处 Benefit for Edition Based Redefinition

GoldenGate 能够处理在线DDL 操作 GoldenGate able to manage Online-DDL operations

✓ 能够在一个事务中处理多个表格式 Ability to work with multiple Table shapes within one transaction
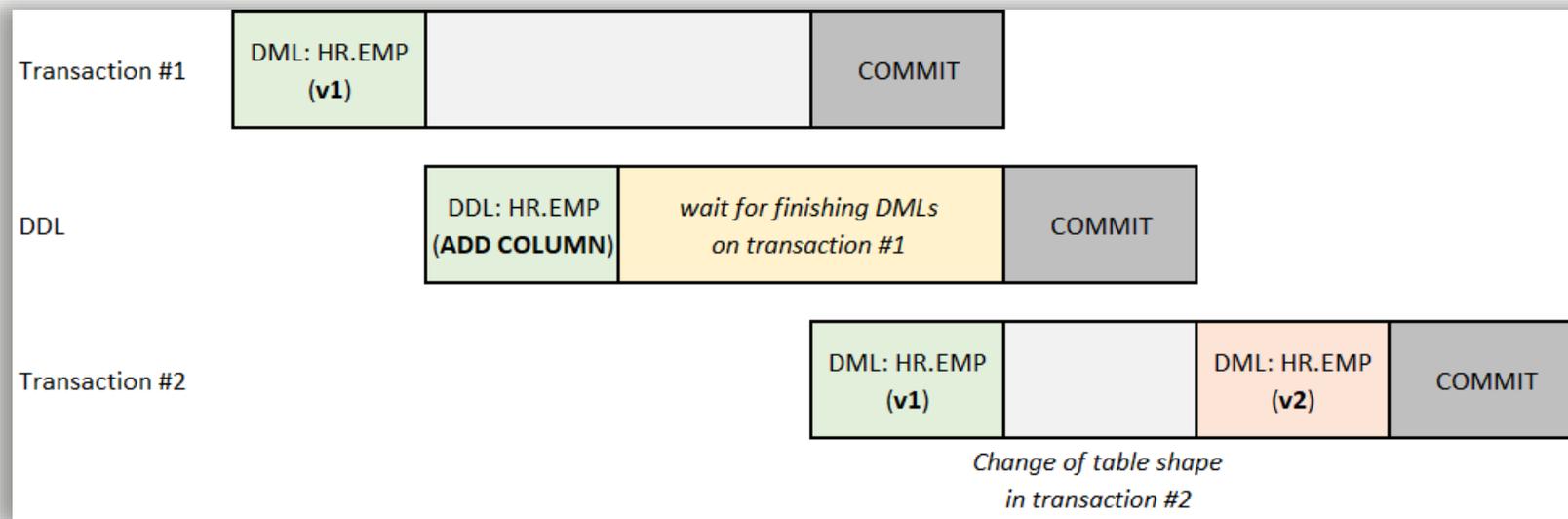
DDL事件通知
DDL Event Notification

GoldenGate 23c 使用新的 Oracle 23c 功能具有更高的弹性
Higher Resilience with new Oracle Database 23c Feature used by GoldenGate 23c

- Replicat 会自动收到目标数据库 DDL 更改的通知 Replicat gets automatically notified of target Database DDL changes

- Replicat 使 Cache 失效、反映更改并不间断地进行处理 Replicat invalidates the Cache, reflects changes, and processes without any interruption

- 新的 GoldenGate 参数New Parameter: **TARGETDDLNOTIFY | NOTARGETDDLNOTIFY** （默认启用 enabled by default ）

Source	Target
HR.EMP(ID, NAME, OLD_ORG_ID)	HR.EMP(ID, NAME, OLD_ORG_ID)
INSERT (4711,'SMITH', 42)	
COMMIT;	
(4711,'SMITH', 42)	(4711,'SMITH', 42)
	ALTER TABLE HR.EMP DROP COLUMN (OLD_ORG_ID);
INSERT (5636,'JONES', 42)	
COMMIT;	
	OGG-01296: Error mapping from HR.EMP to CDB19 SOUTH.HR.EMP
(3636,'JONES', 41)	No Error: Replicat keeps continuously processing Higher Resilience: No (Auto)Restart necessary

数据库 23c 的 ACDR 增强功能
ACDR Enhancements for Database 23c

ACDR

- 管理和维护 AUTO_CDR 配置表的简化方法 Simplified methods to manage & maintain AUTO_CDR configured tables.

- 默认情况下，调用 DELETE_AUTO_CDR 时 Auto-CDR 内部列被标记为 UNSED By default, Auto-CDR internal columns are marked as UNSED when calling DELETE_AUTO_CDR Auto-CDR

- 稍后在维护时段中删除未使用的列 Removing UNUSED columns in a maintenance window at a later time:

  ✓ ALTER TABLE DROP … UNUSED COLUMN

  ✓ DBMS_REDEFINITION

- 对于需要资源密集型操作的大型表很有用 Useful for large tables where the operation is resource intensive.

- 可以使用 DELETE_AUTO_CDR 来立即删除 Auto-CDR 内部列 To drop Auto-CDR internal columns immediately with DELETE_AUTO_CDR:

  ✓ 使用ADD_AUTO_CDR/ALTER_AUTO_CDR调用中additional_options参数的REMOVE_HIDDEN_COLUMNS标志
    Use REMOVE_HIDDEN_COLUMNS flag of additional_options parameter from ADD_AUTO_CDR/ALTER_AUTO_CDR call

- 支持 ACDR 相关表上的 DBMS_REDEFINITION Support for DBMS_REDEFINITION on ACDR related tables

自动冲突检测和解决
Automatic CDR

Oracle 数据库长期版本的改进 Improvement by Long Term Releases of the Oracle database

- 带主键表的最新时间戳冲突解决 **(12gR2)**
  Latest Timestamp Resolution for tables with Primary Keys **(12gR2)**
- 列组合 Column Groups **(12gR2)**
- 分段 LOB 更新 Piecewise LOB Update **(12gR2)**
- 具有唯一键的表的自动 CDR Automatic CDR for tables with Unique Keys **(18c)**

19c

- 最早时间戳冲突解决 Earliest timestamp resolution **(21c)**
- 删除总是优先 Delete always win **(21c)**
- 站点优先级冲突解决 Site priority resolution **(21c)**
- 演进中的ACDR表 Evolving ACDR Tables **(23c)**
  - ✓变化中的 ACDR表 Changing ACDR Tables
  - ✓简化从表中删除 ACDR Simplified Removal of ACDR from Tables

23c

自动CDR主要的视图
Auto CDR Important Views

自动冲突检测和解决对于任何双活和多主机 GoldenGate 实施都至关重要。 以下是收集 ACDR 信息的一些有用视图

Automatic Conflict Detection and Resolution is critical to any active/active and multi-master GoldenGate implementation. Below are some useful views to gather ACDR information:

- **DBA_APPLY_ERROR_MESSAGES**

  显示有关数据库中所有应用进程生成的所有错误事务中的单个消息的信息。
  Displays information about the Individual messages in all the error transactions generated by all applied processes in the database.

- **DBA_GG_AUTO_CDR_TABLES**

  提供有关为 Oracle GoldenGate 自动冲突检测和解决 (CDR) 配置的所有表的详细信息。
  Provides details about all the tables configured for Oracle GoldenGate automatic conflict detection and resolution (CDR).

- **DBA_GG_AUTO_CDR_COLUMNS**

  提供数据库中和Oracle GoldenGate 自动冲突检测和解决 (CDR) 有关的所有列的详细信息。
  Provides details about all the Oracle GoldenGate automatic conflict detection and resolution (CDR) columns in the database.

- **DBA_GG_AUTO_CDR_COLUMN_GROUPS**

  提供数据库中和Oracle GoldenGate 自动冲突检测和解决 (CDR) 有关的所有列的组合的详细信息。
  Provides details about all the Oracle GoldenGate automatic conflict detection and resolution (CDR) column groups in the database.

ACDR
VIEWS

@DBFunction

问题 Problem:

时间敏感的应用程序/业务运营（ETL 流程）需要知道更改何时对最终用户"可见"。Time sensitive Applications/Business Operations (ETL processes) needs to know when the change is 'visible' to the End-User.

复制时间戳不反映数据库内的 DML 时间戳 Replicat Timestamp does not reflect the DML Timestamp within the Database

复制时间戳早于数据库时间戳 Replicat Timestamp is earlier than the Database Timestamp

解决方案 Solution:

使用数据库时间戳调用数据库内的函数
Call Function within the Database using the Database Timestamp

```
MAP CDB1_PDB1.U1.T0, TARGET CDB1_PDB2.U1.T0, KEYCOLS (N1),
    COLMAP (USEDEFAULTS,
    TS         = @DBFUNCTION('SYSTIMESTAMP'),
    UNIX_TIME  = @DBFUNCTION('CONVERT_TO_UNIX_TIME(SYSTIMESTAMP)'));
```


Trail Files   Replicat   Database

@DBFUNCTION (🕐)

t_1 Replicat t_2 Database
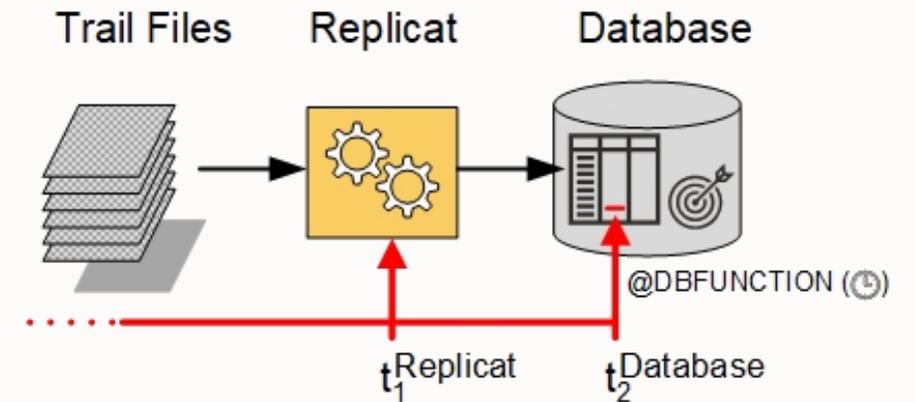
安全、性能和监控
Security, Performance & Monitoring

—

GoldenGate 支持更长的数据库密码
GoldenGate support for longer database passwords

- 当用户密码包含 NLS 字符时，当前 30 字节密码的限制过于严格，实际上只允许客户使用大约 8-9 个字符。
  The current limitation of 30 bytes passwords was too restrictive when the User Passwords have NLS characters, effectively allowing customers to only have around 8-9 characters.

- 自治数据库需要数据库用户密码超过30字节，以便跨服务具有统一的密码规则。其他访问管理解决方案（例如 IAM/IDCS）分别支持最多 100 个和 500 个字符的密码。
  Autonomous Databases need DB User passwords to be more than 30 bytes so that they can have uniform password rules across services. Other Access Management Solutions like IAM/IDCS support passwords up to 100 and 500 characters, respectively.

- 将数据库用户密码的最大长度增加到 1024 字节。
  Increased the maximum length of database user passwords to 1024 bytes.

- 密码验证的安全角色现在支持最大 1024 字节的密码。
  Password Authenticated Secure Roles now supports passwords up to 1024 bytes.

How Safe Is Your Password?
Time it would take a computer to crack a password with the following parameters

Number of characters	Lowercase letters only	At least one uppercase letter	At least one uppercase letter +number	At least one uppercase letter +number+symbol
1	Instantly	Instantly	-	-
2	Instantly	Instantly	Instantly	-
3	Instantly	Instantly	Instantly	Instantly
4	Instantly	Instantly	Instantly	Instantly
5	Instantly	Instantly	Instantly	Instantly
6	Instantly	Instantly	Instantly	Instantly
7	Instantly	Instantly	1 min	6 min
8	Instantly	22 min	1 hrs	8 hrs
9	2 min	19 hrs	3 days	3 wks
10	1 hrs	1 mths	7 mths	5 yrs
11	1 day	5 yrs	41 yrs	400 yrs
12	3 wks	300 yrs	2,000 yrs	34,000 yrs

Source: Security.org

数据库 23c 中新的基于角色的权限模型
New Role based Privilege Model in Database 23c

- 新的基于角色的方法来授予复制所需的权限
  New Role based approach to grant privileges necessary for Replication

- 替换 DBMS_GOLDENGATE_AUTH.GRANT_ADMIN_PRIVILEGE (23c不再可用)

- 要创建 GoldenGate 管理用户，您必须创建一个用户并向新创建的用户授予适当的 OGG_* 角色：
  To create a GoldenGate Administration user, you have to create a user and grant the appropriate OGG_*
  roles to newly created user:

    - OGG_CAPTURE
    - OGG_APPLY,
    - OGG_APPLY_PROCREP

```
SQL>GRANT OGG_CAPTURE TO <user>;

SQL>GRANT OGG_APLLY TO <user>;

SQL>GRANT OGG_APLLY_PROCREP TO <user>;
```

- 调用旧的基于 PL/SQL 的过程调用不会授予任何权限
  Calling old PL/SQL based procedure call does not grant any privileges

  - 将引发警告消息，警告过程调用已被禁用。
    Warning message is raised alerting that the procedure call is disabled.

简化的最大可用性架构 (MAA)

Simplified Maximum Availability Architecture (MAA)

轻松以最大可用性在全球范围内运行 GoldenGate
Making it easy to run GoldenGate at planet-scale with maximum availability

配置简单 Easy configuration
- 自动化生命周期/切换 Automated lifecycle/cutovers
- 动态、热备节点 Dynamic, hot standby nodes

没有共享文件系统 No shared file systems
- DBFS 或 ACFS 可选 DBFS or ACFS are optional
- 动态重建GG Tx日志 Dynamic rebuilding of GG Tx logs
- 用于存储配置和检查点数据的新后端插件 New back-end plugins for storing config and checkpoint data

星球级高可用性 Planet scale high availability
- 在全球范围内运行可操作的数据库
  Run operational DBs globally
  - *Oracle or non-Oracle DBs*
- 支持分片或非分片数据库
  Supports sharded or non-sharded DBs
- 内置自动冲突修复 Built-in automatic conflict repairs
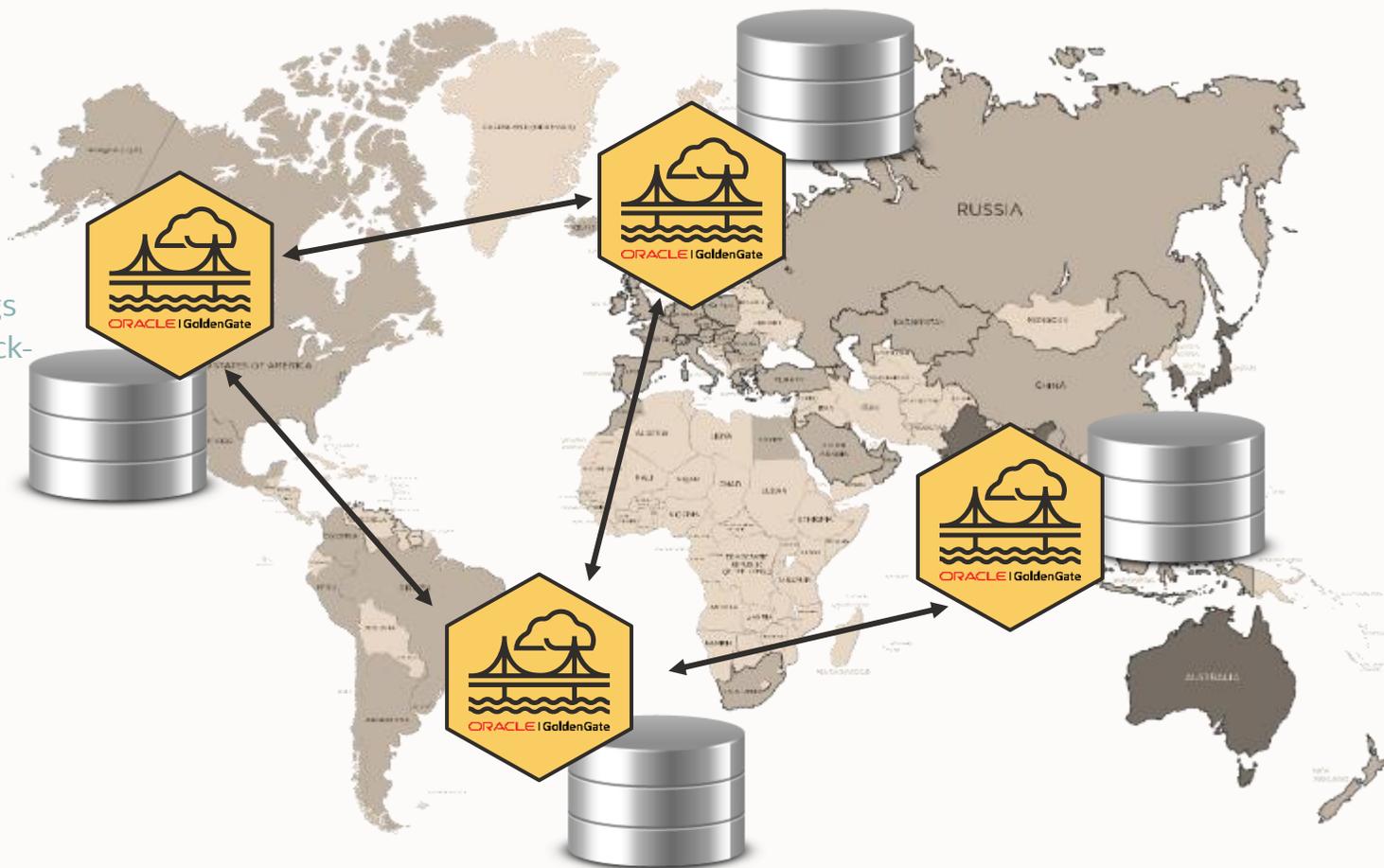
GoldenGate 资源分享

GoldenGate 官方学习资料

https://docs.oracle.com/en/middleware/goldengate/core/index.html

GoldenGate 认证信息

https://www.oracle.com/integration/goldengate/certifications/

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谢谢
Thank you