



# Artificial Intelligence: The Next Generation

Cloud **Essentials**

**ORACLE**<sup>®</sup>  
Cloud

Today's artificial intelligence (AI) systems bring a higher degree of automation to everyday activities, from transportation to shopping to wealth management.

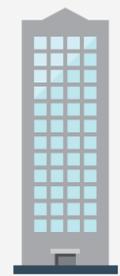
AI technology enhances user experiences via direct language interaction with chatbots—intelligent software programs that can carry on conversations with humans via text-based and voice-based interfaces.

AI systems also supply intelligence and insight to business activities such as customer experience (CX), enterprise resource planning (ERP), supply chain management (SCM), and human capital management (HCM).

Machine learning strategies make use of new techniques to discover patterns in consumer and business data, bolstering data mining capabilities and enhancing predictive analytics with accurate recommendations based on contextual insights.

The opportunities are nothing short of remarkable.

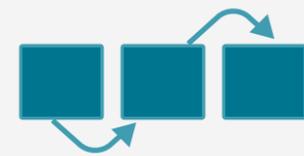




### Traditional Enterprise



Limited Data Use



Explicit Process



Smart People



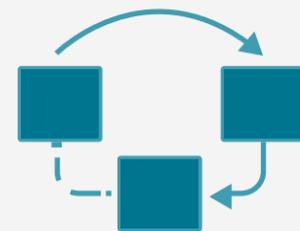
Efficient Monitoring

## AI Provides New Opportunities

### AI Improved Enterprise



Massive Data Use



Adaptive Process



Augmented Experience



Autonomous Operations

AI is dynamic, continuous, and transformative. Thanks to machine learning techniques, the more data introduced and the more people who interact with these intelligent systems, the more accurate and personalized the responses become. Whether it's credit-card offers based on consumer purchasing behavior or conversational interactions with business applications, AI-enabled apps continuously learn and adapt as you use them—including learning from your speaking patterns and adapting their responses based on moment-to-moment behavior. Over time, these information systems can not only detect trends, but also act on them and adapt their behavior in commercially beneficial ways.

Oracle has established machine learning capabilities throughout its product portfolio to enable organizations to develop and deploy AI-enabled applications and platforms. This brief explains how to create a flexible AI platform and describes the impact of embedding AI capabilities in IT operations such as security and management, and departmental business processes including CX, ERP, SCM, and HCM.

## Introducing a Cohesive AI Platform

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AI has immense potential, but to be truly innovative you need a platform that takes you beyond mere standalone programming languages, statistical algorithms, open-source utilities, and disconnected cognitive components. Oracle has created an integrated and intelligent enterprise AI platform to accommodate complex human decision-making and automated

operational processes. It is based on a scalable cloud infrastructure that allows these systems to expand linearly and generate personalized outcomes such as recommending specific actions, coordinating diverse activities, triggering automated workflows, and anticipating and guiding user behavior. Whether your organization is staffed with data scientists, developers, or end users, Oracle's open, multitier AI platform can deliver intelligence and insight to your business.

Oracle is embedding AI capabilities across its product portfolio to usher in a new world of intelligent business applications, platforms, and processes by investing in seven core areas: an AI-managed and secure infrastructure, AI data management, AI analytics, AI development services, AI services, AI data services, and AI business applications.

## AI for everybody

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- Business users can embed machine learning technology in Oracle enterprise business and analytical applications.
- Developers and data scientists can build custom, intelligent solutions that respond knowledgeably to input.
- IT operations personnel can bolster cybersecurity, system administration, and database management.



# Oracle AI Platform Built for End Users and Data Scientists

## Ready to Use

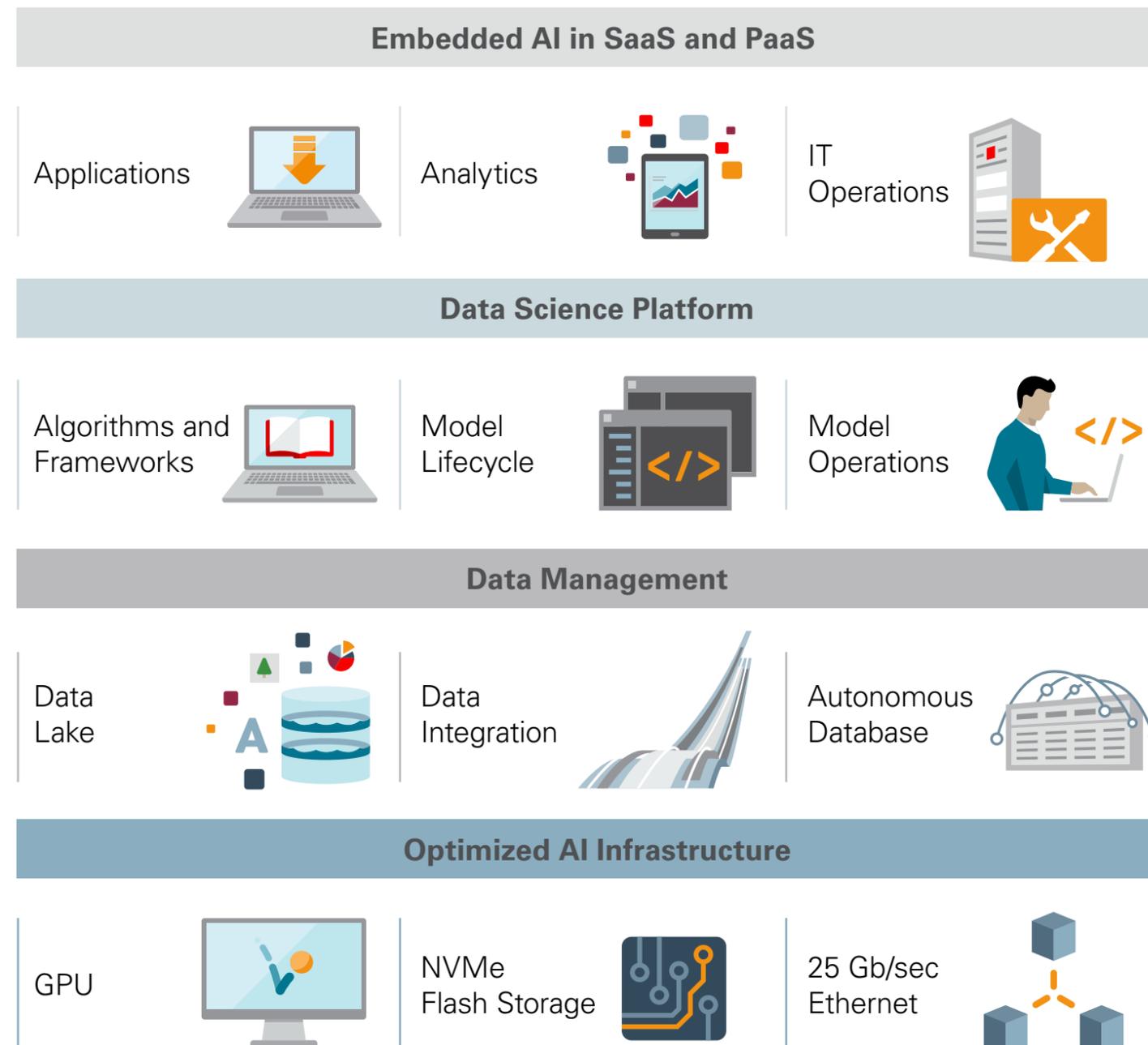
- Adaptive apps that learn and predict
- Autonomous IT operations

## Extensive Data Science Platform

- Collaborative model-building lifecycle
- Industry leader for data and integration

## Optimized and Secure AI Infrastructure

- Best-in-class compute instances, networks, and storage



## A Vision for AI in the Cloud

Oracle's enterprise AI vision includes infrastructure, development, and management tools, prebuilt cognitive services, and AI-enabled business applications.

- At the **SaaS layer**, these AI-infused applications target business users and include relevant business data.
- At the **PaaS layer**, Oracle offers unique products for data scientists and developers to create advanced AI solutions using the latest high-performance hardware. Oracle also embeds AI capabilities enabling autonomous database lifecycle management for self-driving, self-securing, and self-repairing.
- At the **intersection of the PaaS and IaaS layers**, Oracle embeds AI capabilities into the security and management across on-premises and Oracle Cloud operations. Across these layers, Oracle uses AI to manage and secure the platform.



## Applying AI to Operations

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Oracle has embedded machine learning technology into its management and security products to continuously monitor IT operations. Purpose-built machine learning algorithms automate the monitoring of applications, infrastructure, security breaches, and vulnerabilities. Oracle Management Cloud includes machine learning capabilities to manage and secure heterogeneous information systems across cloud and on-premises environments.

## Automatically respond to security threats

Oracle's new cloud security platform is the world's first comprehensive and adaptive Security Operations Center (SOC). By using machine learning to analyze the full breadth of security telemetry (including not only activity but full asset and identity context), Oracle Identity Security Operations Center enables your organization to quickly adapt its security posture as the risk landscape changes, helping to prevent attacks and reduce the detection window from months to minutes.

## Deploy an intelligent infrastructure

Oracle Cloud Infrastructure combines the elasticity and utility of a public cloud with the granular control, security, and predictability of on-premises infrastructure. That means you can quickly establish a high-performance, high-availability, cost-effective infrastructure. You can build powerful AI training and inference-processing platforms with specialized parallel processing GPUs operating on dedicated compute nodes across fast networks.

## Streamline application development

Oracle's integrated, cloud-based platform streamlines the entire application development to delivery process. Developers enjoy automated artifact discovery and dependency management, with policy-based dependency updates to increase code quality and enhance developer productivity. AI capabilities include automated identification and remediation of security issues. Automated code generation and single-button deployment enable rapid application development even by line-of-business users.



## Create Conversational AI Interfaces

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While voice-activated digital assistants such as Amazon Alexa and Apple Siri attempt to respond to every type of request, businesses use chatbots within circumscribed domains to solve very specific problems such as facilitating customer-service interactions, thereby increasing user satisfaction and economically scaling operations.

Oracle Intelligent Bots enable you to quickly and easily build sophisticated conversational bots, adding voice and text to any application.

### **Advanced conversational experiences**

To provide a natural conversational experience, advanced implementations make use of multiple well-integrated, knowledge-specific chatbots. Using AI, conversational context can be captured and then used to orchestrate control across chatbots. The context is further enhanced with shared self-learning capabilities based on user behavior, context, preferences, and data. In addition, the open messaging framework allows integration with speech-based devices such as Amazon Echo (Alexa), Apple Siri, Google Home and Speech, Harman Kardon (Cortana), and Microsoft Cortana.

The Oracle system uses machine learning and natural language processing to recognize context and sentiment. This cognitive AI service adapts to the user's conversational style and delivers contextually relevant responses as the volume of conversations grows.

As part of the Oracle Mobile Cloud Enterprise platform, Oracle Intelligent Bots can readily access, integrate, and leverage Oracle SaaS, third-party cloud, and on-premises applications, bringing additional cognitive intelligence to complex computing environments.

## Cloud Services That Simplify IT

Oracle Cloud Platform advanced services make it easy to create nonstop, highly reliable computing platforms, with inherent automation to minimize IT maintenance chores. That means you can take advantage of sophisticated cloud capabilities without having to develop advanced skills.

The portfolio is anchored by Oracle Autonomous Database, which is characterized by three unique attributes:

- It's **self-driving**, which means it automatically provisions, secures, monitors, tunes, and upgrades itself—lowering costs and increasing productivity.
- It's **self-securing**, reducing risks by protecting cloud resources from external attacks and

malicious internal users. This includes automatically applying security patches with no downtime, automatically encrypting all data, and intercepting data leaks with preventive controls.

- It's **self-repairing**, maximizing uptime and productivity with 99.995 percent availability. That's less than 2.5 minutes of both planned and unplanned downtime per month, and the complete elimination of administrative errors.

# Oracle Cloud Platform Advanced Services

## Data Management



- Launch a data warehouse in seconds
- Pay for what you use
- No human labor and no human error means lower costs and risk

## Application Development



- Automatically resolve security issues in software code
- Self-learning, self-training bots

## Service and Integration



- Self-defining integrations and data flows
- Intelligent data profiling

## Analytics



- Automated data discovery and preparation
- Automated visualization and narration

## Security and Management



- Preventative controls to intercept data leaks
- Automatic maintenance of performance and security monitoring



## Intelligent Platform Services

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### **IoT applications**

Oracle Internet of Things (IoT) applications capture sensor data, use AI techniques to predict and detect anomalous conditions, and direct users and businesses towards an optimal course of action. This evolving IOT Cloud application suite offers industrial monitoring applications for assets, production, fleets, and workers. These applications leverage a vast array of business data from Oracle and non-Oracle applications, including manufacturing, maintenance, service, and logistics, to improve prediction quality. Oracle IoT applications use time-series machine data and combine it with contextual business data to automatically select the best-fit predictive model from the built-in library of machine learning algorithms.

### **Rich data services**

Oracle Adaptive Intelligent Apps combine internally available information in corporate databases, as well as from Oracle's vast resources in Oracle Data Cloud. For example, the AI algorithms embedded in Oracle Adaptive Intelligent Apps for Customer Experience analyze customer data that retailers have gathered about their own customers as well as data in Oracle Data Cloud, a collection of more than 5 billion consumer and business IDs and 7.5 trillion data points. These algorithms create a continuous feedback loop that retailers can use to deliver targeted product recommendations that consider each customer's tastes and interests from moment to moment. Retailers can also use these capabilities to generate dynamic category pages that personalize search suggestions and blend search results with real-time offers. Other statistical algorithms predict customer motivations and purchasing behavior by applying data about past trends to current conditions.

## Natural and better analytics

As data volumes continue to increase, data-savvy executives and analysts need breakthrough approaches to quickly understand and use their data to make decisions. Oracle has applied AI and machine learning to help them take the next step. For example, in Oracle Analytics Cloud, natural language processing makes it easy to work with your data, while machine learning technology powers the business analytics value chain. The chain starts with discovery, moves to preparing and augmenting data, then on to analysis, modeling, and finally, to prediction.

To simplify data discovery and analysis, chatbots are used to create a natural and personalized conversational interaction. As people ask questions, the bot learns nuance and company-specific vocabularies.

If there is uncertainty, the bot requests clarification. When the bot responds, it transforms numerical and contextual data into natural conversational phrases—a breakthrough in convenience and productivity.

Oracle Data Visualization allows you to begin your visual analysis with automatically generated findings, based on correlations and patterns discovered in a broader context of contributing factors.

This autonomous capability not only speeds up analysis, but can eliminate preconceived notions of causes and effects, thereby delivering true insight. Machine learning expands the context and accuracy of the prediction models to allow adaptive, high-value interactions—whether it's finding the best profile for hiring employees or recommending preventative maintenance.

“ To simplify data discovery and analysis, chatbots are used to create a natural and personalized conversational interaction. ”

## Applying AI to Business Applications

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Today's business leaders must use data intelligently to confront an increasingly challenging business climate. Consumers are less loyal and revenue, elusive. Value chains have become more fluid and costs, more variable. What's needed is an approach that learns from past mistakes, stays current with customer and competitor trends, and suggests or takes action immediately, so that time is not wasted nor opportunities lost.

Oracle Adaptive Intelligent Apps is an innovative application suite that uses machine learning and decision science to discover patterns in continuously changing data, then makes recommendations based on prior outcomes and goals. The more they are used, the more competent these apps become. They consume a spectrum of internal business data from Oracle SaaS applications and combine it with relevant real-time external data such as weather, geolocation, sensor, and consumer data.

**Finance** professionals, for example, can negotiate optimal supplier terms, while balancing cash flow needs, especially during critical financial events (such as at the end of a quarter or when confronting a high volume of payables).

**Human resources** recruiters can automatically create job descriptions that match the interests of candidates browsing open positions, helping applicants find the positions they are suited for.

**Marketing** managers can boost conversion rates, encourage repeat purchases, and ultimately drive revenue with intelligent apps that can present smart contextual offers tailored to individual consumers.

**Supply chain** managers can optimize pricing and ensure the best-value transportation options for enterprise shippers.

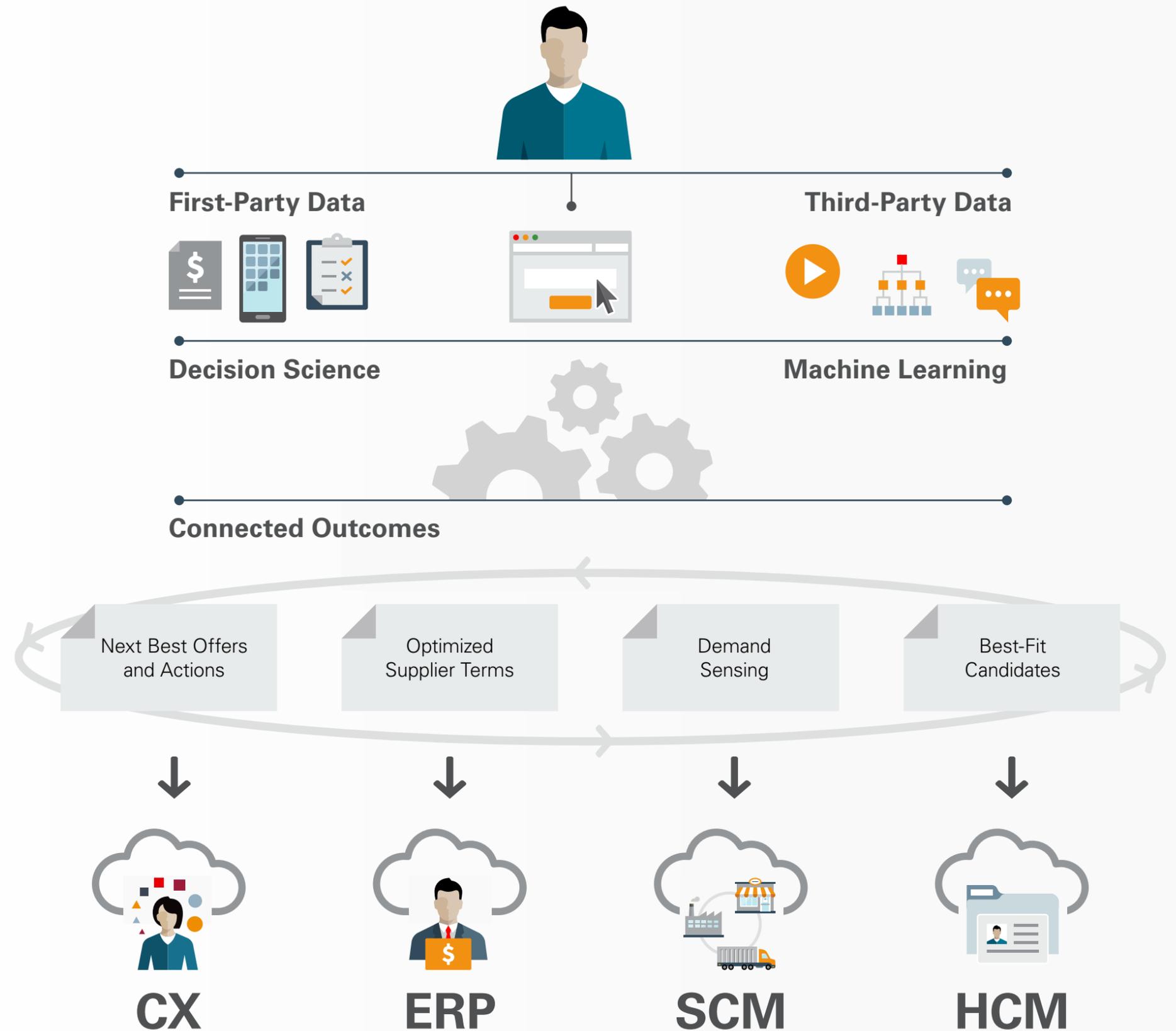
## Common AI Use Cases

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- Presenting relevant offers to shoppers
- Identifying the best candidates to fill job openings
- Calculating the best shipping methods for time-sensitive materials
- Determining optimal payment terms to suppliers

# Oracle Adaptive Intelligent Apps

- Purpose-built and ready to go
- Enriched with third-party data
- Bundled decision science
- Runs on Oracle Cloud
- Connected intelligent outcomes



## Customer experience

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### **Oracle Customer Experience Cloud**

Oracle Adaptive Intelligent Apps  
for Customer Experience

Customer experience management is the practice of designing and reacting to customer interactions to meet or exceed customer expectations, and thereby increasing customer satisfaction, loyalty, and advocacy. Oracle Adaptive Intelligent Apps turn this vision to reality by consolidating all types of customer data, including social profiles and insights from third-party data sources, and then leveraging that data to engage users with personalized in-the-moment offers and experiences.

Consider the perennial task of student recruiting. For example, a customer experience management application with adaptive intelligence could analyze each student's reading, math, and writing scores in conjunction with individual browsing histories to generate personalized offers. A student with great math scores might trigger an invitation for a one-on-one tour with an engineering professor. If that student is also interested in basketball, the system might suggest a visit during one of the university's upcoming home games.



## Supply chain management

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### Oracle Supply Chain Management Cloud

Oracle Adaptive Intelligent Planning and Bidding Cloud Service

Today's data-driven analytics apps gather insights from a variety of sources as they connect to other business apps, both on premises and in the cloud. These connections are essential to SCM solutions that monitor the flow of materials and information, from suppliers to manufacturers to wholesalers to retailers and finally to consumers.

Adaptive intelligence apps help coordinate and optimize these flows to reduce costs and improve efficiencies (such as finding the most expedient and affordable options for multimodal freight shipments).

Consider a soda manufacturer that depends on sugar beets as an essential component of its manufacturing process. If beet production in Ecuador takes off, an SCM application with adaptive intelligence might recommend that the manufacturer stop buying beets from Venezuela and capitalize on an expected price drop from Ecuador. By tracking the price and volatility of this commodity over time, along with other market indexes, the app could even estimate how far prices will go down, how much to buy, and when.

## Adaptive

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- **Adapt** to user behavior based on how "like people" respond, moment to moment.
- **React**, change, and tailor offers based on how users proceed through a site, click by click.
- **Deliver** relevant, optimized outcomes in real time that continuously improve in accuracy.





## Enterprise resource planning

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### **Oracle Enterprise Resource Planning Cloud**

Oracle Adaptive Intelligent Apps for Enterprise Resource Planning

Oracle Adaptive Intelligent Apps play an important role in ERP systems, from optimizing payment terms to strategically sourcing suppliers. A finance organization can use AI to uncover supplier credit opportunities and optimize payment discounts. Simultaneously, procurement groups can use financial and other business data to support strategic sourcing by continuously analyzing and recommending suppliers. AI optimizes financial and supplier management by merging ERP data with third-party business information including financial, supply chain, regulatory, and compliance.

## Intelligent

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- **Derive** intelligence from third-party data—in real time and at scale.
- **Synthesize** contextual recommendations from weather forecasts, life events, real-time user actions, social-media activity, and more.
- **Identify** and deliver optimal individualized outcomes—in the moment.

## Human capital management

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### Oracle Human Capital Management Cloud

Oracle Adaptive Intelligent Apps for Human Capital Management

HCM is an essential part of any organization. Most companies have identified the need for competency in three HCM categories: workforce acquisition, workforce management, and workforce optimization. Within the discipline of workforce acquisition, HR departments can use Oracle Adaptive Intelligent Apps to narrow down the best possible candidates for open positions. For example if a recruiting manager is filtering graduates from nearby colleges and universities, the technology can help her identify ideal candidates, such as multidisciplinary students who combine a degree in the sciences with strong communication skills. As the system filters prospective employees, it will gradually become aware of relevant trends, perhaps noting schools that produce a preponderance of graduates with engineering majors and liberal arts minors. This insight could direct the company to host job fairs on those campuses, or in the towns where those schools are located.

# Oracle Adaptive Intelligent Apps

**Purpose-built AI and data-driven applications**

**Connected intelligence amplifies the value of CX, ERP, SCM, and HCM**



### Oracle CX Cloud

- Next-best offers and recommendations
- Coordinated open-time content
- Intuitive search experiences
- Connected audiences
- Optimized marketing orchestrations
- Best sales actions
- Smart call points
- Automated answers



### Oracle ERP Cloud

- Optimized supplier payment terms
- Best-fit suppliers



### Oracle SCM Cloud

- Optimized demand sensing
- Dynamic pricing
- Improved quality and yield



### Oracle HCM Cloud

- Best-fit candidates

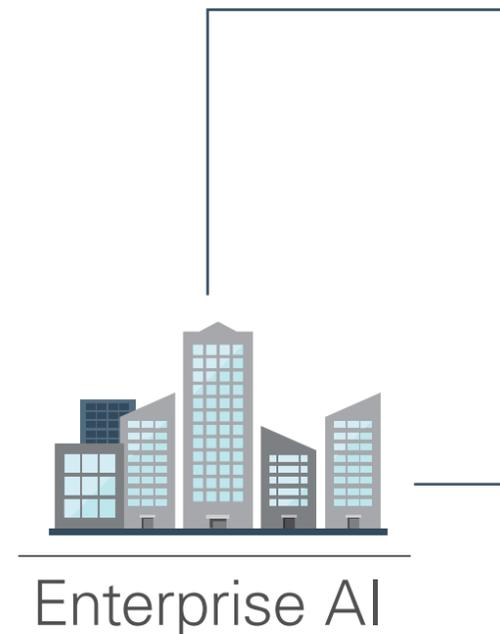
## Key components of Oracle's enterprise AI platform

- AI-enabled SaaS business processes
- Data services for intelligently consuming business and consumer data
- Autonomous Database that is self-driving, self-securing, and self-repairing
- Ready-to-use cognitive services
- Runs on a high-performance computing environment

## Solutions for the Adaptive Enterprise

While early AI systems were narrow in focus and offered limited technology components, Oracle AI applications are ready to use, designed by domain experts, and capable of delivering immediate business value. For custom development, Oracle maximizes developer efficiency with integrated tools, cognitive components, mature AI frameworks, and support for open-source technology. Finally, Oracle AI solutions are optimized for enterprise use with maximum scalability and targeted functionality for multiple lines of business.

# AI Powers the Adaptive Enterprise



### Adaptive Processes

#### Sense and Respond

- Personalization
- Process optimization
- Product improvement

### Augmented Experiences

#### Real-Time Assistance

- Conversational control
- Data discovery
- Developer productivity

### Autonomous Operations

#### Self-Driving, Self Repairing, Self-Securing

- Data management
- Global IT operations
- Security

## Oracle Cloud Platform

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- ✓ **Complete:** Best-of-breed, integrated solutions in every cloud category (DaaS, SaaS, PaaS, and IaaS)
- ✓ **Open:** Standards-based platform supports all workloads, apps, languages, open source, and data types
- ✓ **Secure:** Automated, always-on protection pushed down the entire cloud stack to the silicon layer
- ✓ **Choice:** Flexible deployment options—public, private, Oracle Cloud at Customer, and hybrid cloud
- ✓ **Intelligent:** AI and machine learning built into every layer of data, software, platform, and infrastructure

## Cloud Essentials

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