

ORACLE

Oracle Autonomous Database Update

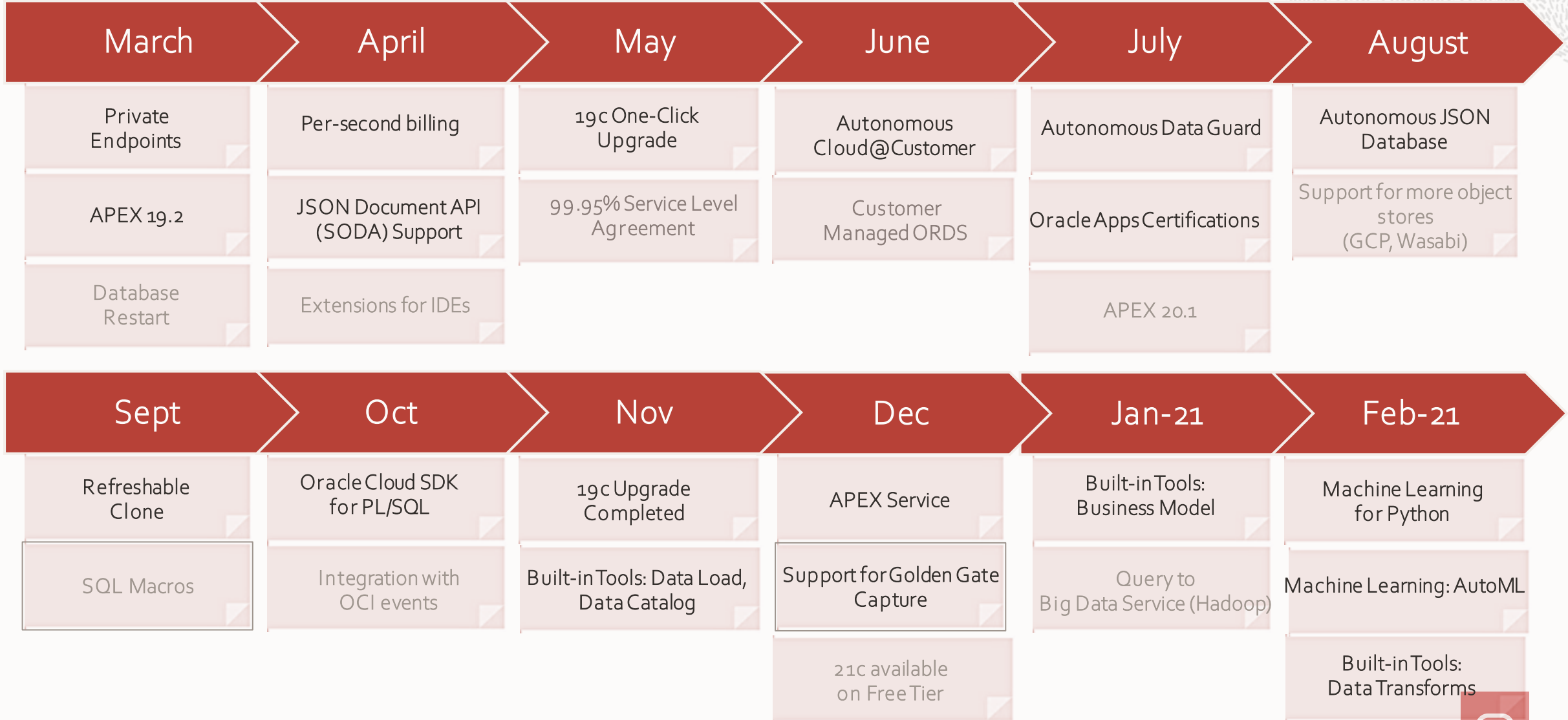
Safe harbor statement

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What's new with Oracle Autonomous Database?



Autonomous Database: Recent New Features



Oracle Machine Learning OML4Py Integration Added to OML on Autonomous Database

ORACLE Machine Learning Template Notebooks [Template N...] CHARLIE

Python

Targeting Customers OML4Py

```
%python
z.show(DEMO_DF.head())
```

CUST_ID	AFFINITY_CARD	BOOKKEEPING_APPLICATION...	BULK_BACK_DISKETTE...	EDUCATION	FLAT_PANEL_MONITO...	HOME_THEATER_PACKA...	HOUSEHOL
102547	0	0	1	10th	1	0	1
101050	0	0		10th	1	0	1
100040	0	0	1	11th	1	0	1

Took 0 sec. Last updated by OMLUSER at August 20 2020, 4:31:31 PM. (outdated)

Took 0 sec. Last updated by OMLUSER at August 20 2020, 4:31:21 PM. (outdated)

Graph HOUSEHOLD_SIZE grouped by AFFINITY_CARD responders

```
%python
z.show(DEMO.crosstab(['HOUSEHOLD_SIZE', 'AFFINITY_CARD']))
```

Took 0 sec. Last updated by OMLUSER at August 20 2020, 4:31:31 PM. (outdated)

Build a Decision Tree Model

```
%python
setting = dict()
dt_mod = oml.dt(**setting)
dt_mod.fit(TRAIN_X, TRAIN_Y, case_id = 'CUST_ID')
```

Algorithm Name: Decision Tree
Mining Function: CLASSIFICATION
Target: AFFINITY_CARD

Settings:

0	setting name	setting value
1	ALGO_NAME	ALGO_DECISION_TREE
2	CLAS_MAX_SUP_BINS	32
3	CLAS_WEIGHTS_BALANCED	OFF
4	ODMS_DETAILS	ODMS_ENABLE
5	ODMS_MISSING_VALUE_TREATMENT	ODMS_MISSING_VALUE_AUTO
6	ODMS_SAMPLING	ODMS_SAMPLING_DISABLE
7	PREP_AUTO	ON
8	TREE_IMPURITY_METRIC	TREE_IMPURITY_GINI

Took 2 sec. Last updated by OMLUSER at August 20 2020, 4:31:35 PM. (outdated)

Display confusion matrix, lift chart and ROC curve

CONFUSION MATRIX	PREDICTED 0	PREDICTED 1
ACTUAL 0	True Negative: 1288 (72.56%)	False Positive: 52 (2.93%)
ACTUAL 1	False Negative: 259 (14.59%)	True Positive: 176 (9.92%)
Accuracy: 82.4789%		

Took 1 min 22 sec. Last updated by OMLUSER at August 20 2020, 4:32:59 PM. (outdated)



Oracle Machine Learning for Python

Integration with Open Source Python

Transparency layer

- Use familiar R/Python syntax to manipulate database data

Parallel, distributed algorithms

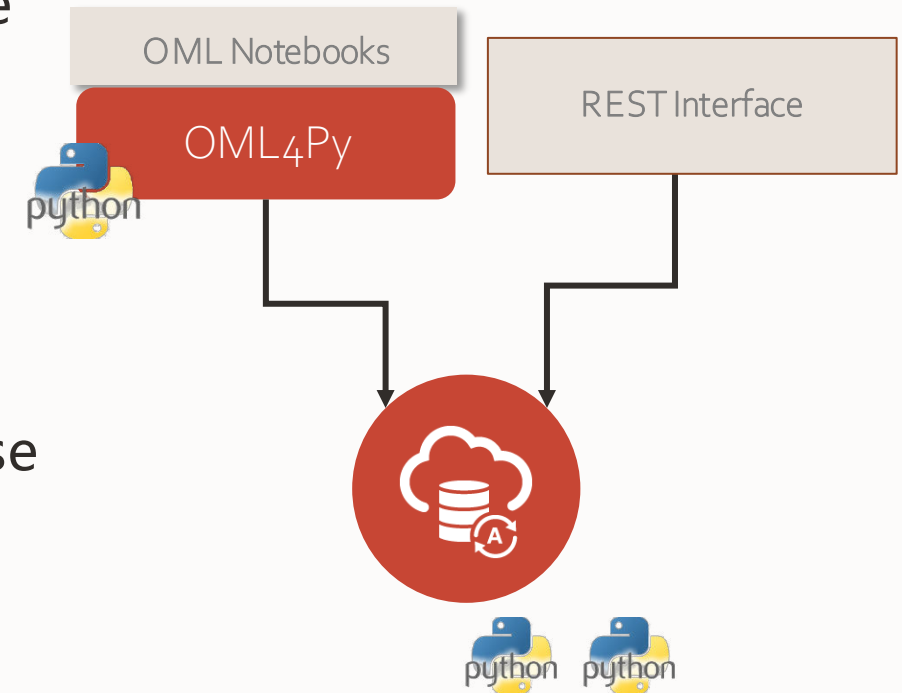
- Use in-database algorithms from Python API
- Scalability and performance

Embedded execution

- Manage and invoke Python scripts in Oracle Database
- Use open source packages to augment functionality

OML4Py, Automated Machine Learning - AutoML

- Algorithm selection, feature selection, auto tune hyperparameters

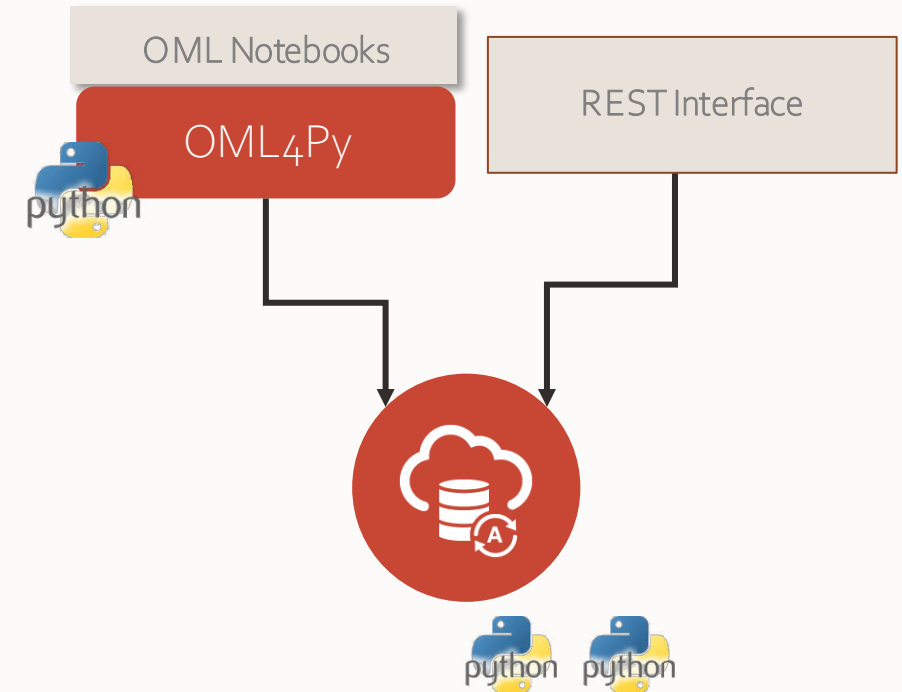


Oracle Machine Learning for Python

Integration with Open Source Python

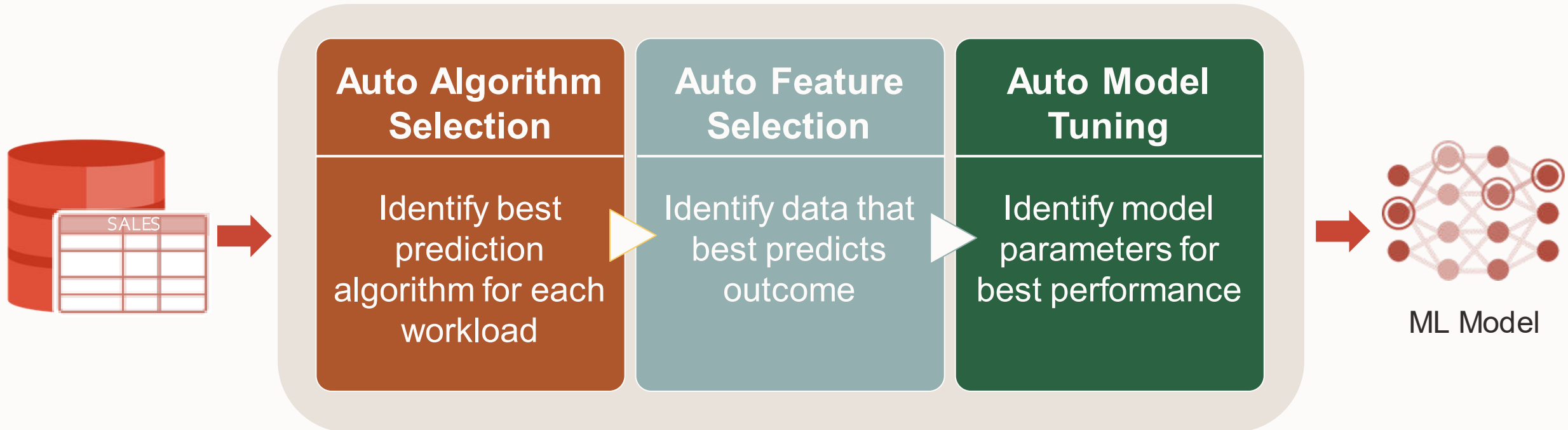
OML4Py details and supported packages

- Python 3.8.2
- cx_Oracle
- cycler
- joblib
- kiwisolver
- matplotlib
- numpy
- pandas
- Pyparsing
- python_dateutil
- pytz
- scikit-learn
- scipy
- six
- setuptools



AutoML

Faster and Easier Machine Learning for Data Scientists and Developers



ENABLES NON-EXPERT USERS TO LEVERAGE MACHINE LEARNING



Coming Soon! | OML AutoML UI

“Code-free” AutoML based UI supporting automated end-to-end ML



Targets: Citizen Data Scientist, Data Scientists and Appl Developers

Key Features

- Intuitive, easy to use
- Minimal user input: data, target
- Automates ML steps
- Make ML simpler

The screenshot displays the Oracle Machine Learning AutoML UI. The main section is titled 'Create Experiment' and includes the following fields:

- Name: Targeting Customers
- Comments: (empty)
- Data Source: (empty)
- Prediction Type: (dropdown menu)

Below the form is a 'Features' table with the following data:

Name	Importance	Type
OCCUPATION	High	VARI
YRS_RESIDENCE	High	NUM
BOOKKEEPING_APPLICATION	Low	NUM
COMMENTS	Low	VARI
AFFINITY_CARD	Low	NUM
HOME_THEATER_PACKAGE	Low	NUM
Y_BOX_GAMES	Low	NUM
FLAT_PANEL_MONITOR	Low	NUM
BULK_PACK_DISKETTES	Low	NUM
CUST_ID	Low	NUM

On the right side, there is a 'Metric Chart' showing a line graph with a value around 80. Below it is a 'Leader Board' section with a 'Model Details' popup showing the following information:

- Algorithm: Naive Bayes
- Model Name: r_t_5169b6e5
- Metrics: Prediction Impacts, Confusion Matrix
- Decision Tree: (empty)





Coming Soon! | OML AutoML UI

“Code-free” AutoML based UI supporting automated end-to-end ML

ORACLE Machine Learning MSPIVAK Project [MSPIVAK Works...] MSPIVAK

How Do I?

- Use AutoML**
How to create AutoML Experiments
- Get Started**
Get started with Oracle Machine Learning
- Create Notebooks**
How to create a notebook
- Create Jobs**
How to create a job
- Manage Permissions**
How to manage collaborative permissions in workspaces
- Try It**
Follow along with a hands on workshop

Recent Notebooks

Nothing to Display

Quick Actions

- AutoML**
Create and run AutoML Experiments
- Scratchpad**
Run Scratchpad
- Notebooks**
The place for data discovery and analytics
- Jobs**
Schedule notebooks to run at certain times
- Examples**
Check out some examples

Recent Activities

AutoML

last Monday

- MSPIVAK **created** test1_2 notebook in MSPIVAK Project [MSPIVAK Workspace]
8/17/20 4:54 PM
- MSPIVAK **created** test1_1 notebook in MSPIVAK Project [MSPIVAK Workspace]
8/17/20 1:16 PM
- MSPIVAK **created** test1 notebook in MSPIVAK Project [MSPIVAK Workspace]
8/17/20 1:15 PM





Coming Soon! | OML AutoML UI

“Code-free” AutoML based UI supporting automated end-to-end ML

ORACLE Machine Learning

MSPIVAK Project [MSPIVAK Works...]

MSPIVAK

Create Experiment

Start Save Cancel

Name * Targeting Customers

Comments

Data Source *

Prediction Type * Select Prediction Type

Predict * Select Prediction Target

Case ID Select Case ID

Additional Settings

Features

Refresh Search...

<input type="checkbox"/>	Name	Type	Percent NULLs	Distinct Values	Min	Max	Mean	Std Dev
No data to display.								

Create an Experiment

Select Data Source





Coming Soon! | OML AutoML UI

“Code-free” AutoML based UI supporting automated end-to-end ML

Select Table

Schema	Table
ADBSNMP	COSTS
ADMIN	PRODUCTS
GGADMIN	PROMOTIONS
JJSANCHE	CHANNELS
MSPIVAK	SALES
SH	SUPPLEMENTARY_DEMOGRAPHICS
SSB	TIMES
	COUNTRIES
	CUSTOMERS

Select Data Source

Search

OK Cancel





Coming Soon! | OML AutoML UI

“Code-free” AutoML based UI supporting automated end-to-end ML

ORACLE Machine Learning

MSPIVAK Project [MSPIVAK Works...]

MSPIVAK

Create Experiment

Start Save Cancel

Name *
Targeting Customers

Comments

Data Source *
SH.SUPPLEMENTARY_DEMOGRAPHICS

Prediction Type *
Select Prediction Type

Additional Settings

Features

Refresh

<input type="checkbox"/>	Name	Type	Percent NULLs
<input checked="" type="checkbox"/>	AFFINITY_CARD	NUMBER	0
<input checked="" type="checkbox"/>	BOOKKEEPING_APPLICATION	NUMBER	0
<input checked="" type="checkbox"/>	BULK_PACK_DISKETTES	NUMBER	0
<input checked="" type="checkbox"/>	COMMENTS	VARCHAR2	4.772991850989523
<input checked="" type="checkbox"/>	CUST_ID	NUMBER	0

Predict *
Select Prediction Target

CUST_ID
NUMBER

EDUCATION
VARCHAR2

OCCUPATION
VARCHAR2

HOUSEHOLD_SIZE
VARCHAR2

YRS_RESIDENCE
NUMBER

AFFINITY_CARD
NUMBER

BULK_PACK_DISKETTES
NUMBER

FLAT_PANEL_MONITOR
NUMBER

HOME_THEATER_PACKAGE
NUMBER

Search...

Std Dev

.6

.45

.68

1306.44

Select Target Attribute



Coming Soon! | OML AutoML UI

“Code-free” AutoML based UI supporting automated end-to-end ML



ORACLE Machine Learning

MSPIVAK Project [MSPIVAK Works...]

MSPIVAK

Create Experiment

Name *
Targeting Customers

Comments

Data Source *
SH.SUPPLEMENTARY_DEMOGRAPHICS

Prediction Type *
Classification

Predict *
AFFINITY_CARD

Case ID
CUST_ID

Start Save Cancel

Experiment is ready to run

Additional Settings

Features

Refresh Search...

<input type="checkbox"/>	Name	Type	Percent NULLs	Distinct Values	Min	Max	Mean	Std Dev
<input checked="" type="checkbox"/>	AFFINITY_CARD	NUMBER	0	2	0	1	.24	.6
<input checked="" type="checkbox"/>	BOOKKEEPING_APPLICATION	NUMBER	0	2	0	1	.89	.45
<input checked="" type="checkbox"/>	BULK_PACK_DISKETTES	NUMBER	0	2	0	1	.64	.68
<input checked="" type="checkbox"/>	COMMENTS	VARCHAR2	4.772991850989523	43				
<input type="checkbox"/>	CUST_ID	NUMBER	0	4500	100001	104500	102250.76	1306.44

Data profile



Coming Soon! | OML AutoML UI

“Code-free” AutoML based UI supporting automated end-to-end ML



Leader Board

Deploy Create Notebook Metrics

Leader board

Algorithm	Name	Accuracy
Naive Bayes	nb_f8637b9359	0.4282
Random Forest	rf_aed7a58923	0.3624
Decision Tree	dt_6cd748831e	0.3624
Neural Network	nn_86b0b368e1	0.3529
Support Vector Machine (Linear)	svml_b3954f73b4	0.3224

Features

Refresh Search...

Attribute importance

Name	Importance	Type	Percent NULLs	Distinct Values	Min	Max	Mean	Std Dev
OCCUPATION	<div style="width: 100%;"></div>	VARCHAR2	0	15				
YRS_RESIDENCE	<div style="width: 10%;"></div>	NUMBER	0	15	0	14	4.02	1.97
BOOKKEEPING_APPLICATION	<div style="width: 5%;"></div>	NUMBER	0	2	0	1	.89	.45
COMMENTS	<div style="width: 10%;"></div>	VARCHAR2	4.772991850989523	43				
AFFINITY_CARD	<div style="width: 10%;"></div>	NUMBER	0	2	0	1	.24	.6
HOME_THEATER_PACKAGE	<div style="width: 10%;"></div>	NUMBER	0	2	0	1	.56	.7
Y_BOX_GAMES	<div style="width: 10%;"></div>	NUMBER	0	2	0	1	.31	.66
FLAT_PANEL_MONITOR	<div style="width: 10%;"></div>	NUMBER	0	2	0	1	.58	.7
BULK_PACK_DISKETTES	<div style="width: 10%;"></div>	NUMBER	0	2	0	1	.64	.68
CUST_ID	<div style="width: 10%;"></div>	NUMBER	0	4500	100001	104500	102250.76	1306.44





Coming Soon! | OML AutoML UI

"Code-free" AutoML based UI supporting automated end-to-end ML

ORACLE Machine Learning

MSPIVAK Project [MSPIVAK Works...]

MSPIVAK

<- Experiments

test 4

▶ Experiment Settings Edit

Metric Chart

100
80
60
40
20
0

Leader Board

Deploy Create Notebook Metrics

Algorithm	Name	Accuracy
Naive Bayes	nb_f8637b9359	0.4282
Random Forest	rf_aed7a58923	0.3624
Decision Tree	dt_6cd748831e	0.3624
Neural Network	nn_86b0b368e1	0.3529
Support Vector Machine (Linear)	svml_b3954f73b4	0.3224
Naive Bayes	nb_f8637b9359	0.4282
Random Forest	rf_aed7a58923	0.3624

Run Summary

- Algorithm Selection Completed
- Adaptive Sampling Completed
- Feature Selection Completed
- Hyperparameter Tuning Completed
- Naive Bayes Completed
- Random Forest Completed
- Neural Network Completed
- Decision Tree Completed
- Support Vector Machine (Linear) Completed

Model summaries

Create Notebook





Coming Soon! | OML AutoML UI

"Code-free" AutoML based UI supporting automated end-to-end ML

Deploy Model

Name *
DT0002806B977AFB4

URI *

Version *

Namespace

Shared

OK Cancel

Enter a unique, alphanumeric Name (max 50 characters)

Model deployment

Name	Namespace	Model Type	Creation Date	Target
DT0002806B977AFB4			2020-08-23	EDUCATION
DT0002838F1834DAF			2020-08-22	EDUCATION
DT000283CDCC4A876			2020-08-22	EDUCATION
DT000285826B2E12B			2020-08-23	EDUCATION
DT000288600A0B1C7			2020-08-18	EDUCATION
DT00028B2DB3EDF11			2020-08-22	EDUCATION
DT00028BA251ADB87			2020-08-24	EDUCATION
DT00028BE5495A368			2020-08-18	EDUCATION
DT00028CEDB617784			2020-08-18	EDUCATION
DT00028D9C1C130FC	MSPIVAK	Decision Tree	2020-08-22	EDUCATION
DT00028F5B80E8AFD	MSPIVAK	Decision Tree	2020-08-22	EDUCATION
DT00028FDEE8C073C	MSPIVAK	Decision Tree	2020-08-14	EDUCATION





Coming Soon! | OML AutoML UI

“Code-free” AutoML based UI supporting automated end-to-end ML

The screenshot shows the Oracle Machine Learning Model Repository interface. The main view is the 'Deployments' tab, displaying a table of models. A modal window titled 'Model metadata for DT000281545B55889' is open, showing the following JSON metadata:

```
{
  "miningFunction": "CLASSIFICATION",
  "algorithm": "DECISION_TREE",
  "attributes": [
    {
      "name": "AFFINITY_CARD",
      "attributeType": "NUMERICAL"
    },
    {
      "name": "BOOKKEEPING_APPLICATION",
      "attributeType": "NUMERICAL"
    },
    {
      "name": "OCCUPATION",
      "attributeType": "CATEGORICAL"
    },
    {
      "name": "Y_BOX_GAMES",
      "attributeType": "NUMERICAL"
    }
  ],
  "output": {
    "name": "EDUCATION",
    "attributeType": "CATEGORICAL"
  },
  "labels": [
    "10th",
    "11th",
    "12th",
    "13th"
  ]
}
```

An arrow points from the text 'Model metadata & model deployment via OML Services REST API' to the JSON metadata in the modal window.

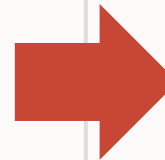
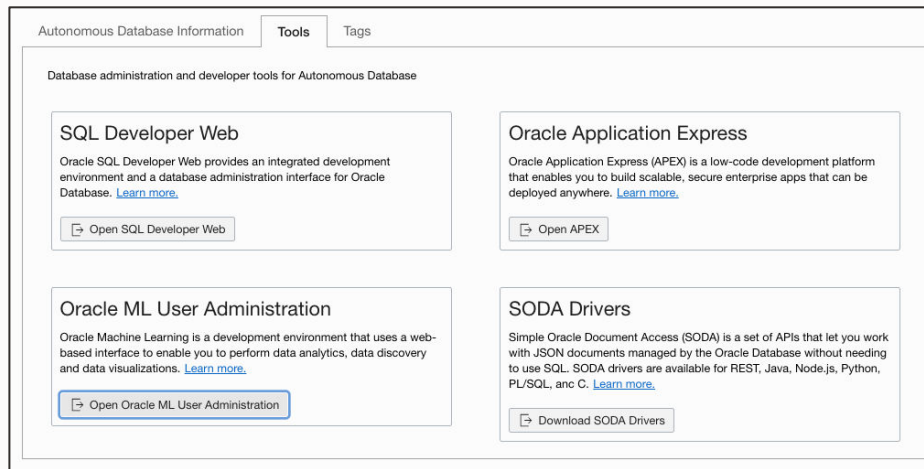


“Just a quick feedback on the ADW 18c to 19c upgrade. Have a **BI dude at a customer site** who cloned his ADW and upgraded while cloning. Tested OAC all good. Now this might not be such a big deal - but it is a big deal. **No DB experience whatsoever**, cloned and upgraded. Easy as that. Thank you, this is brilliant!”

Evolve to become a unified data management platform

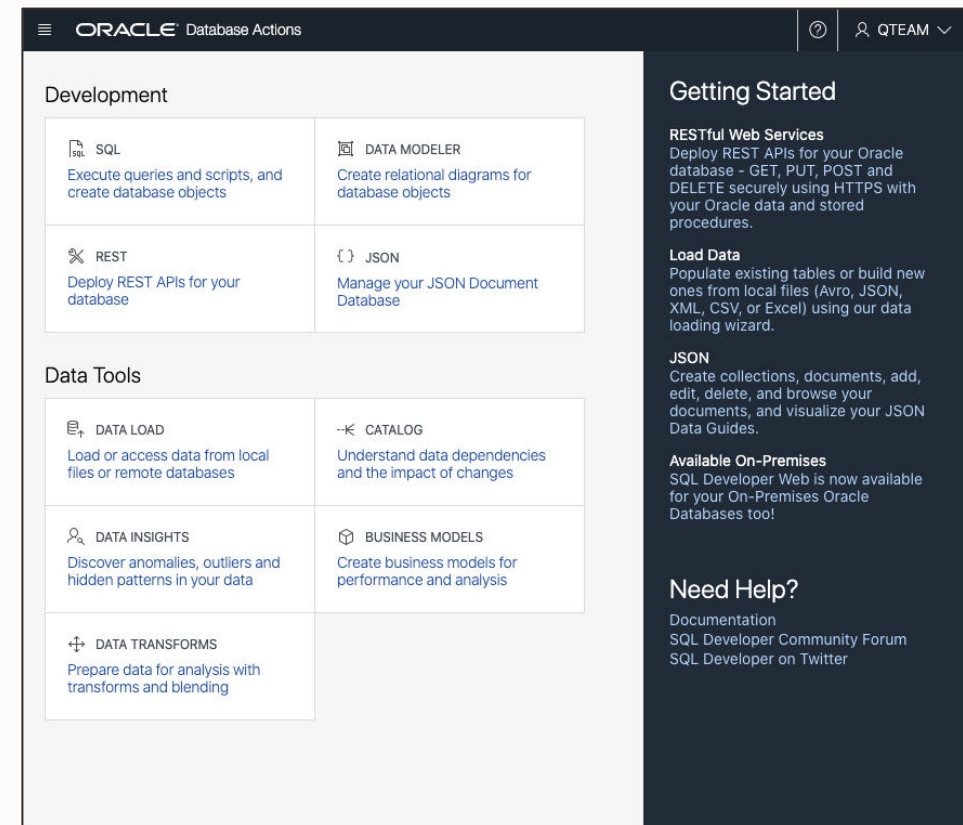
ADB yesterday

- A handful of integrated tools



Autonomous Database today

Broad set of data management tools



Data Load

Simple “drag-and-drop”
data loading

- Files on local computer
- Files in Object Storage (including AWS S3 & Azure Blob Storage)
- Oracle Databases (on-premises and in cloud)

ORACLE Database Actions | Data Load

What do you want to do with your data?

- LOAD DATA**
Import data into your Autonomous Database ✓
- LINK DATA**
Leave your data in place and let your Autonomous Database access it
- FEED DATA**
Setup ongoing feed of new data into your Autonomous Database

Where is your data?

- LOCAL FILE**
Select text or Excel files from your local device ✓
- DATABASE**
Select tables from your remote databases
- CLOUD STORAGE**
Select buckets from cloud storage (Oracle, S3, Azure, Google)

Next

Explore and Connect

- EXPLORE**
Inspect data in your Autonomous Database
- CLOUD LOCATIONS**
Manage connections to your cloud storage (Oracle, S3, Azure, Google)

Getting Started

- Setup an Ingest Job**
Select how you want to analyze your data and where it is. Link and Feed data are only available for network sources
- Explore**
Explore data in your Autonomous Database
- Manage**
Manage your Cloud Storage Locations

Need Help?

- Documentation
- SQL Developer Community Forum
- SQL Developer on Twitter

Data Transforms

Simple “drag-and-drop” data transformations

- Auto code generation for all ODI sources and targets including Fusion and Salesforce
- Built-in data quality

Based upon Oracle Data Integrator

- New, easy-to-use-cloud UI
- Simple migration to ADB for ODI customers
- Exposes all built-in database operators

The screenshot displays the Oracle Data Transforms web interface. The top navigation bar shows 'ORACLE Data Transforms Powered by Oracle Data Integrator'. The main content area is titled 'MovieStream_Q2FY2020' and shows a data flow diagram. The diagram consists of four nodes: 'MOVIE_SALES_...' (top left), 'Q2_Only' (top right), 'Fix_AllCap_Days' (bottom left), and 'MOVIE_SALES_...' (bottom right). Arrows indicate the flow: from 'MOVIE_SALES_...' (top left) to 'Q2_Only', from 'Fix_AllCap_Days' to 'Q2_Only', and from 'Fix_AllCap_Days' to 'MOVIE_SALES_...' (bottom right). The interface includes a left sidebar with 'Data Entities' and 'QTEAM', a top toolbar with 'DATA TRANSFORM' and 'DATA PREPARATION' tabs, and a right sidebar with project details for 'MovieStream_Q2FY2020'.



Modern Data Warehouse *Components*



DATABASE

Autonomous,
self-driving,
self-securing,
self-repairing



INTEGRATION

Streaming,
batch data, both
on-premises and in
the cloud



DATA LAKE

Object storage-
based data lake,
integrated access
with DW



DATA SCIENCE

Machine learning
general purpose
and in-database



ANALYTICS

ML-based analytics
and visualization;
Automatic
narration

Modern Data Warehouse



DATABASE



INTEGRATION



DATA LAKE



DATA SCIENCE

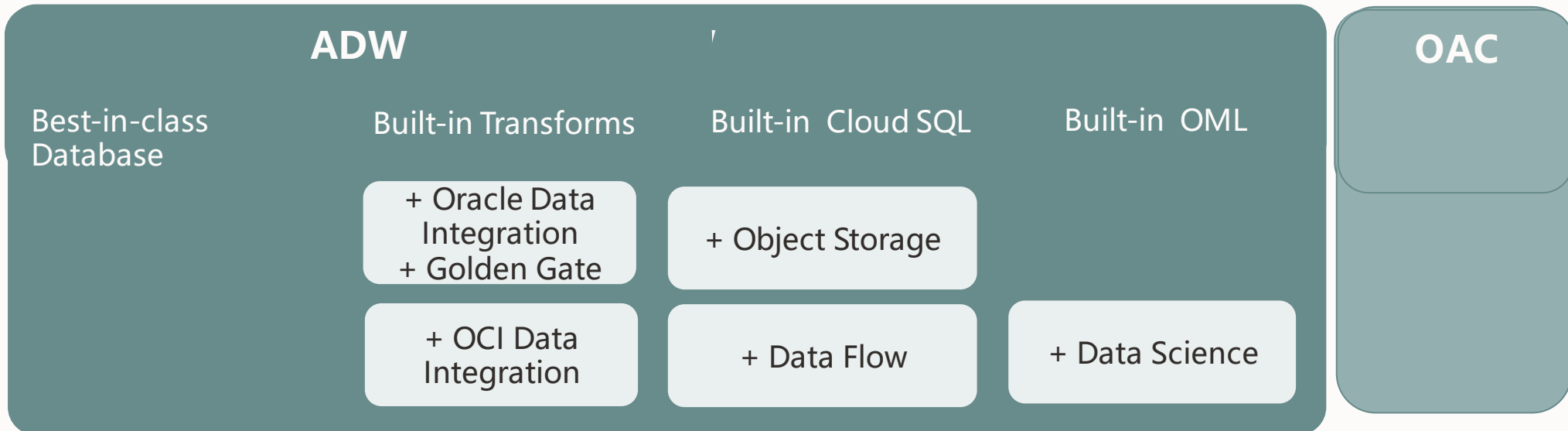


ANALYTICS

Data
Marts

Data
Warehouse

DW/Lake



ORACLE

Upcoming Features

Core Infrastructure	Cross-Region Autonomous Data Guard Customer-managed keys
Broader Analytics	Oracle Machine Learning Python support AutoML Property Graph Queries via PGQL Optimized in-memory performance Notebooks with graph visualization
Data Lake Support	Scalable query offload for object storage OCI Data Catalog integration
Enhanced Tooling	Embedded Data Transformation UI Embedded Business Models UI