工业互联网产业联盟
Alliance of Industrial Internet

工业大数据技术架构白皮书

（1.0）

工业互联网产业联盟
工业大数据特设组
2018年4月

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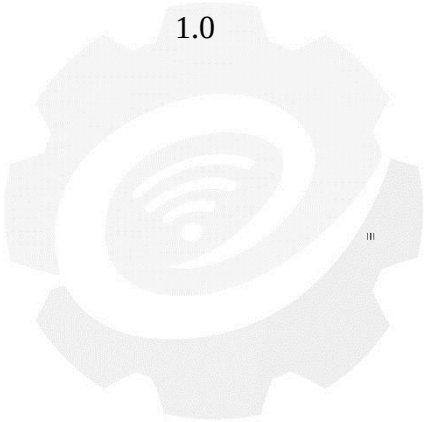

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1.2 2
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2.1 5
2.2 6
2.3 8
2.4 9
2.5 10
.....12
3.1 12
3.1.1 12
3.1.2 16
3.1.3 17
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3.2.1 19
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3.2.3 21
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NPI 26

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LEAP.....59
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3 63
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.....71
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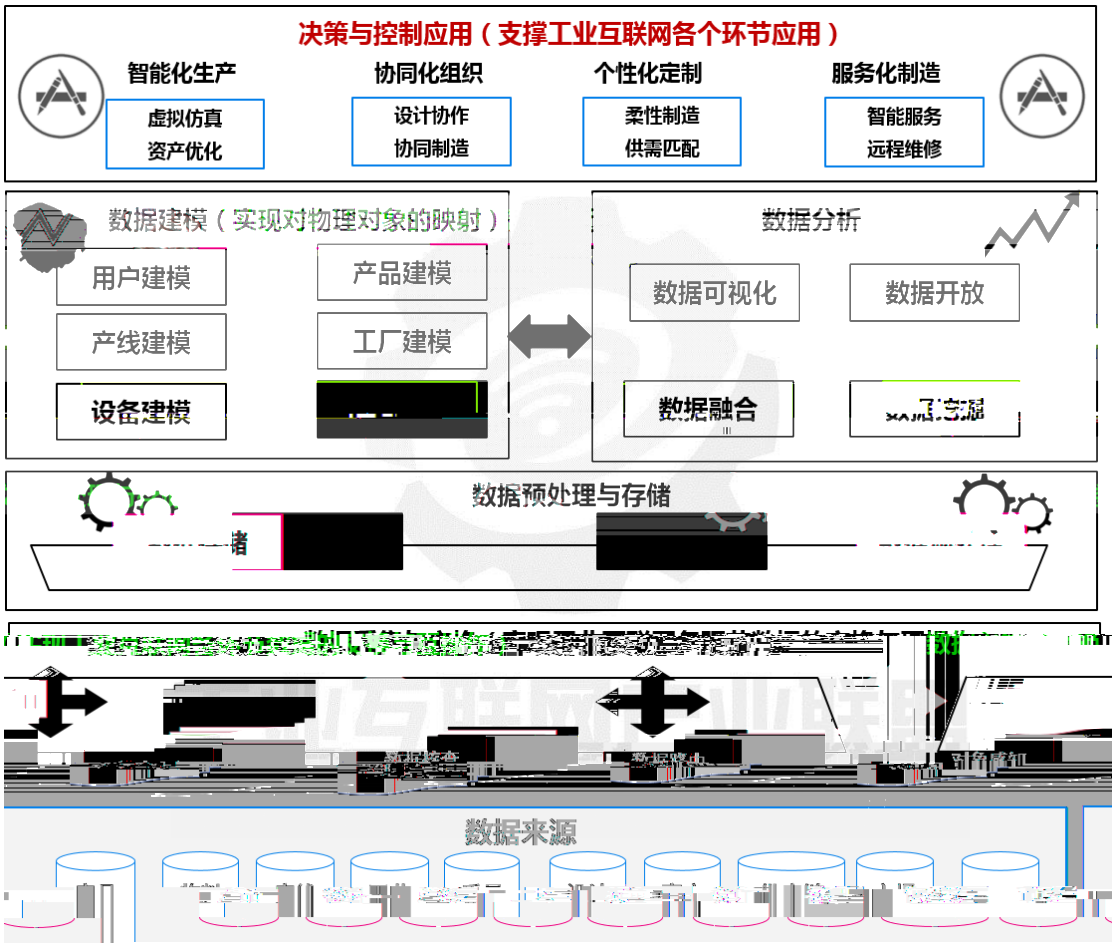
决策与控制应用（支撑工业互联网各个环节应用）
智能化生产
虚拟仿真
资产优化
协同化组织
设计协作
协同制造
个性化定制
柔性制造
供需匹配
服务化制造
智能服务
远程维修
数据建模（实现对物理对象的映射）
用户建模
产品建模
产线建模
工厂建模
设备建模
数据分析
数据可视化
数据开放
数据融合
数据预处理与存储
数据来源

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与

SCADA MES ERP

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Publisher

Subscriber

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ETL

ETL

Hadoop 4

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SQL

NoSQL

NoSQL

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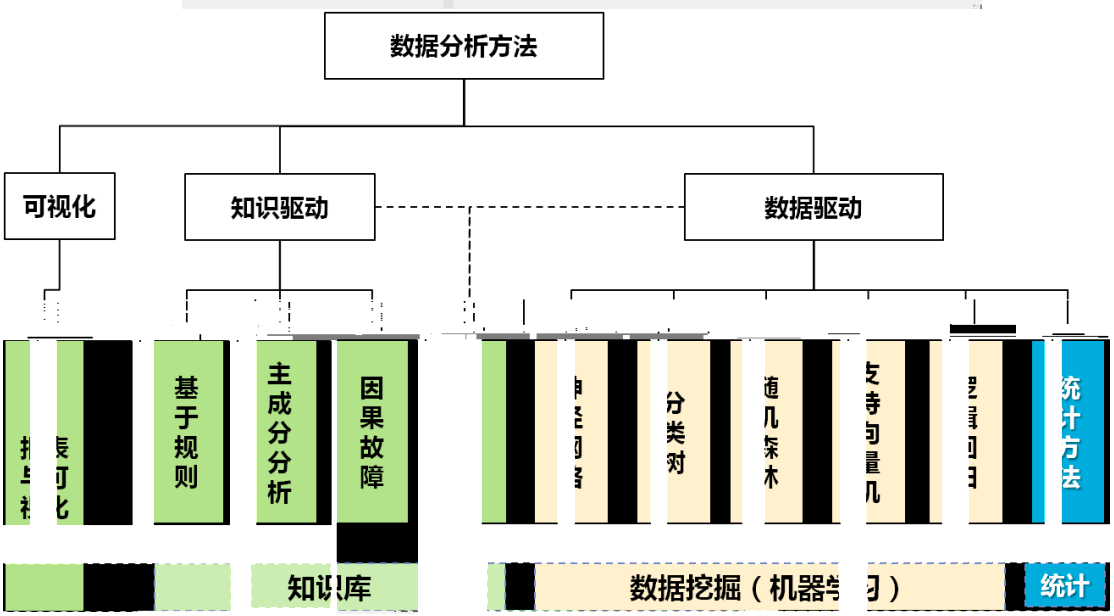

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LTE-eMTC NB-IOT

3.1.2

TB PB

JSON XML

2

	HDFS Hive	
	MPP Cassandra	
NoSQL	HBase MongoDB	
	MySQL SQLServer Oracle PostgreSQL	
	InfluxDB Kdb+ RRDtool	
	Redis Memcached Ignite	
	Neo4j	/
	Solr Elasticsearch	/

Web UI

Redis Ignite

HDFS Cassandra

InfluxDB

3 :

MySQL Oracle

NoSQL Cassandra HBase Redis

3.1.3

SQL

SQL

3

	Storm Spark Streaming Flink	
	MapReduce Spark Hive	
	Graphlab GraphX	
OLAP	MPP	
OLTP	MySQL SQLServer Oracle	
	Cobar TTDL MyCAT	
	Spark TensorFlow	

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1. Storm Spark Streaming Flink

2. MapReduce Spark Hive

3.

4. OLAP MPP

5. OLTP MySQL SQLServer Oracle PostgreSQL

6.

7. 5

Spark

MLlib GraphX TensorFlow Caffe MXNet

Titan

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3.1.4

IT

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3.2.3

3.2.4

3.2.5

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3.2.6

Hadoop Spark MySQL Greenplum

SQL

SQL JDBC ODBC BI

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NPI

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NPI New Product Introduce,

NPI

1 Proto

2 EVT

3 DVT

4 PVT

5 Ramp

6 MP

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FA Failure Analysis RD

FA

80%

20% NPI

20% 80%

NPI

NPI

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DIF&SMC

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2.

1 NPI

SMC(Spark, Mesos, Cassandra)

DIF(Data Integration Framework)

DSP(Data Service Provider) API

FA

1

SMC DIF KM

a) KM Elastic

Search(

b) SMC DIF

DSP API KM API API

a) DSP AIP API FA

b) stored procedure DIF SMC

(Attribute)

c) KM API API

NPI FA

FA

a) FA FA Failure analysis API

b) FA

golden case

c)

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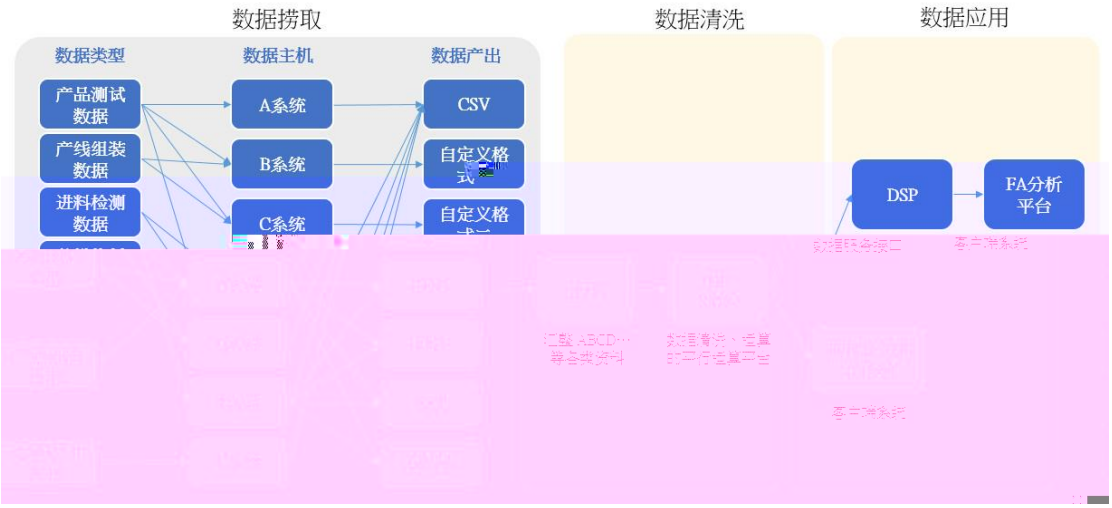

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DIF

Collection Modules Transfer Modules

Analysis Modules

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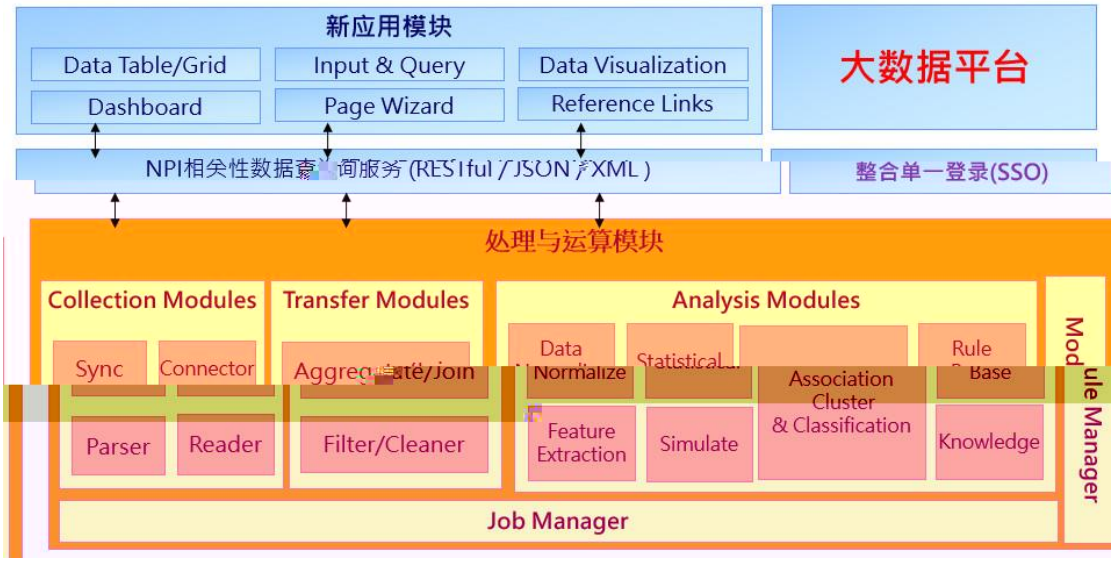

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NPI FA

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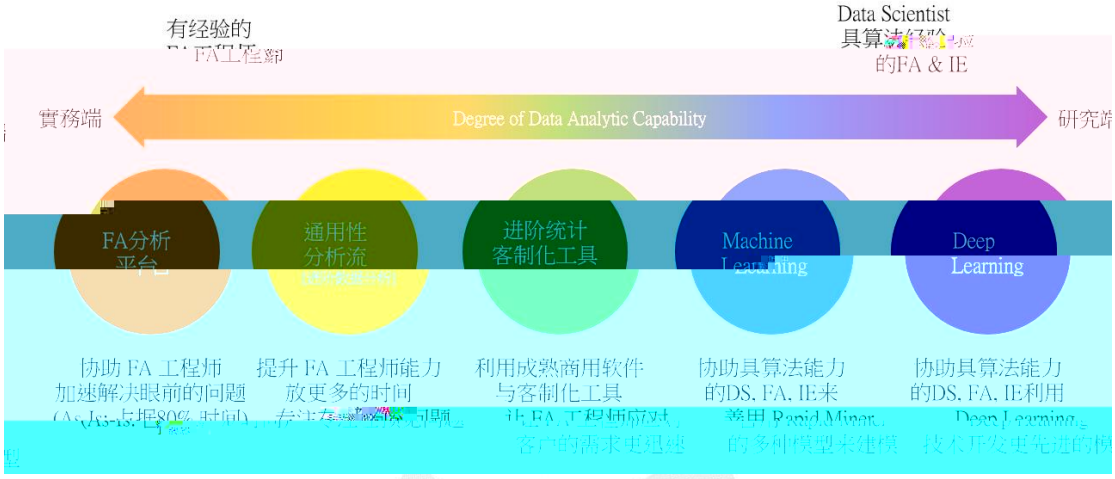

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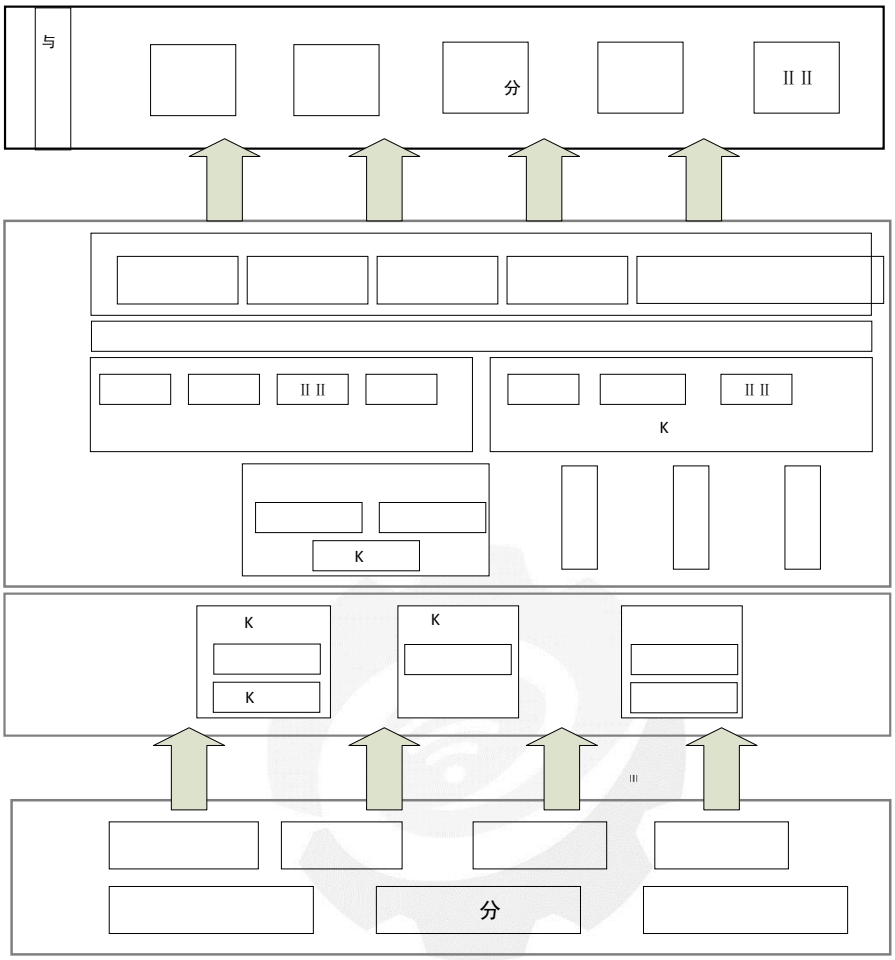

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IT IT

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OCR

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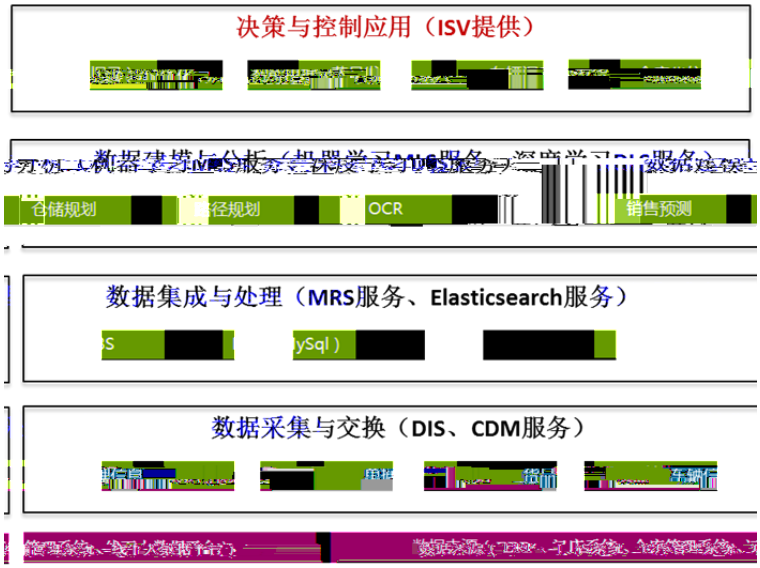
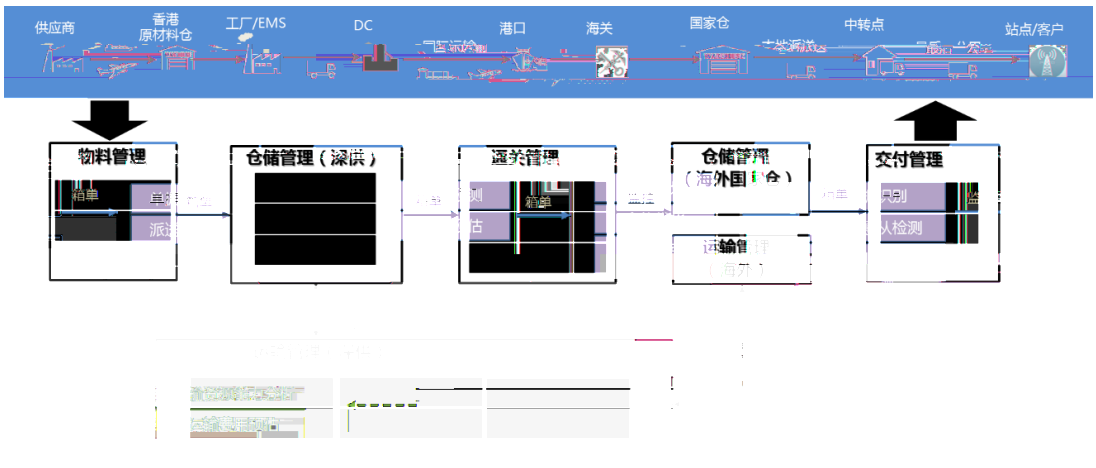
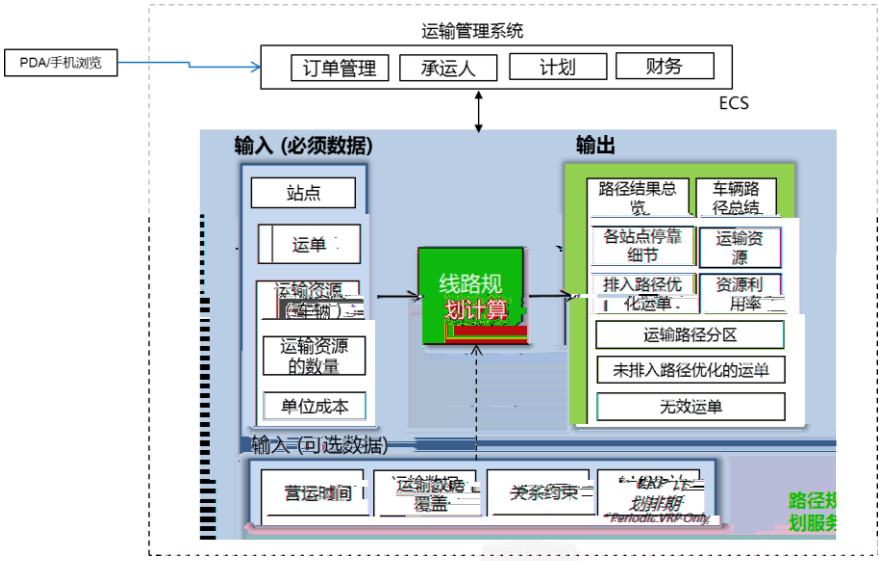

决策与控制应用（ISV提供）
仓储规划
OCR
销售预测
数据集成与处理（MRS服务、Elasticsearch服务）
数据采集与交换（DIS、CDM服务）

与

1.


供应商
香港
原材料仓
工厂/EMS
DC
港口
海关
国家仓
中转点
站点/客户
物料管理
仓储管理（深供）
通关管理
仓储管理
（海外国仓）
交付管理


运输管理系统
PDA/手机浏览
订单管理
承运人
计划
财务
ECS
输入 (必须数据)
输出
站点
运单
运输资源（车辆）
运输资源的数量
单位成本
线路规划计算
路径结果总览
车辆路径总结
各站点停靠细节
运输资源
排入路径优化运单
资源利用率
运输路径分区
未排入路径优化的运单
无效运单
输入 (可选数据)
营运时间
关系约束

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API

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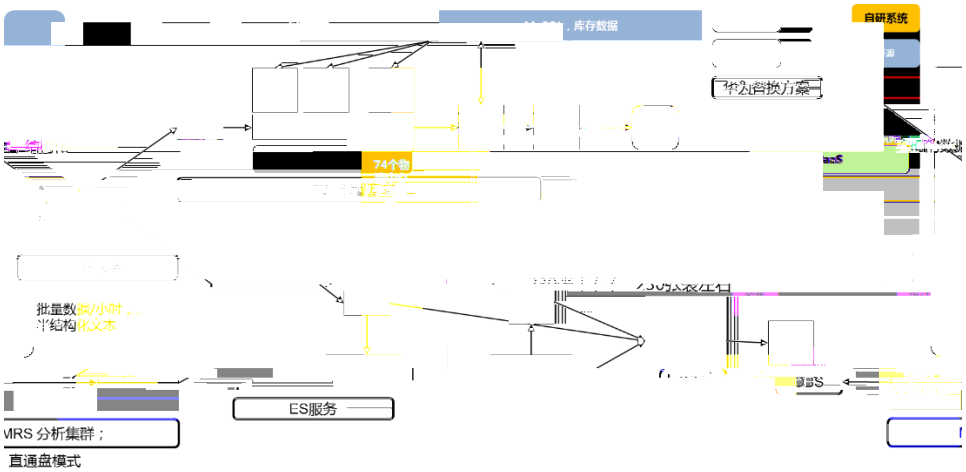
2.


自研系统
ES服务
MRS 分析集群；
直通盘模式

1 ERP

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1 Oracle MySql

DIS

2 CCE

MySql RDS

3 SparkStreaming

Elasticsearch

4 HDFS OBS

MRS OBS

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5 Hadoop Spark

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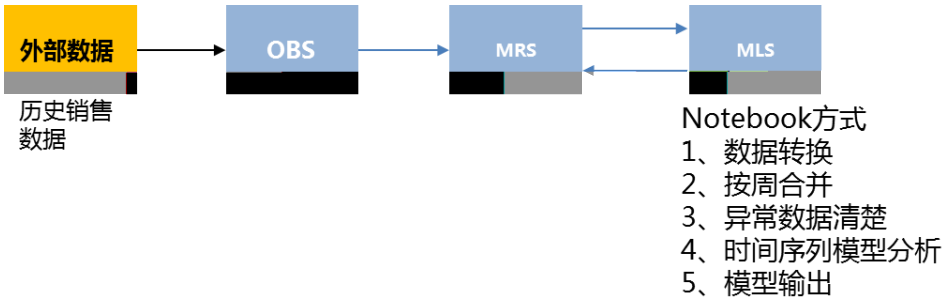
3.



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PCA

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4 Notebook

Run

1 Workflow Notebook

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3 PMML jar

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OCR 30s 10s

OCR

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4 EI

1 API

2 OCR

3 Notebook

4 EI

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IT

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HTTP FTP

Agent

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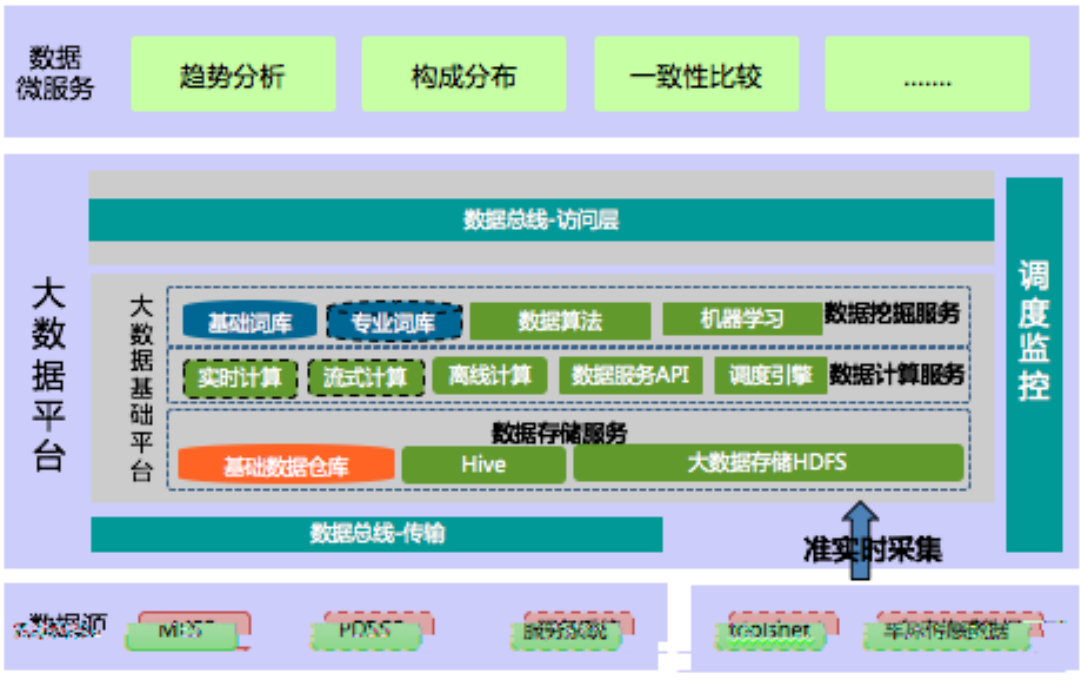

与

■ FTP

FTP get

■ Agent

Flume agent Flume

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Hadoop

■ Http

HTTP

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ES HBase HDFS

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Sqoop

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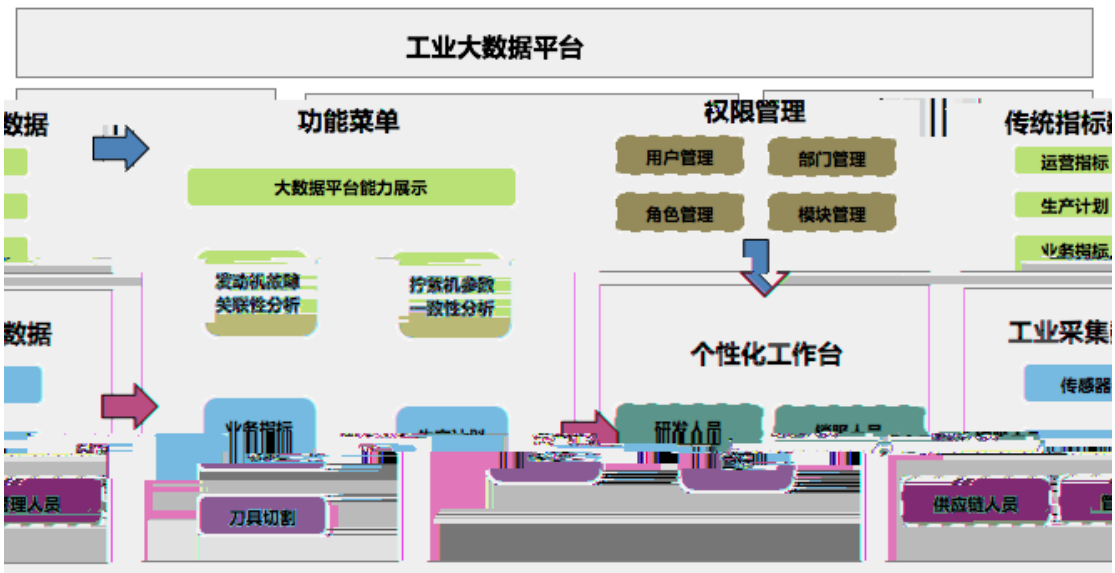

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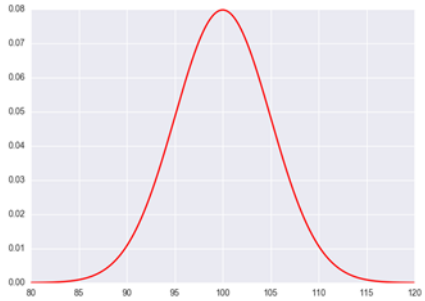

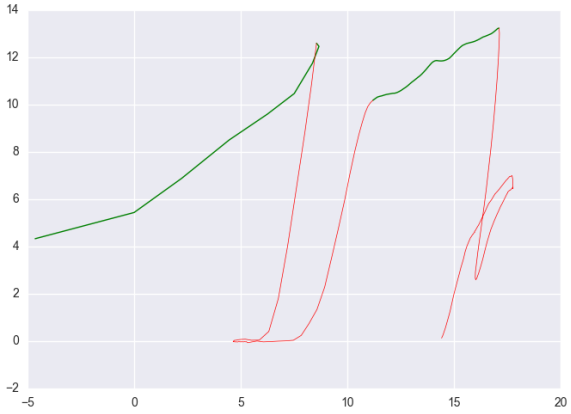

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4.0

OneNET

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OneNET

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3D

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ERP

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OneNET OneNET

OneNET

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OneNET

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ERP

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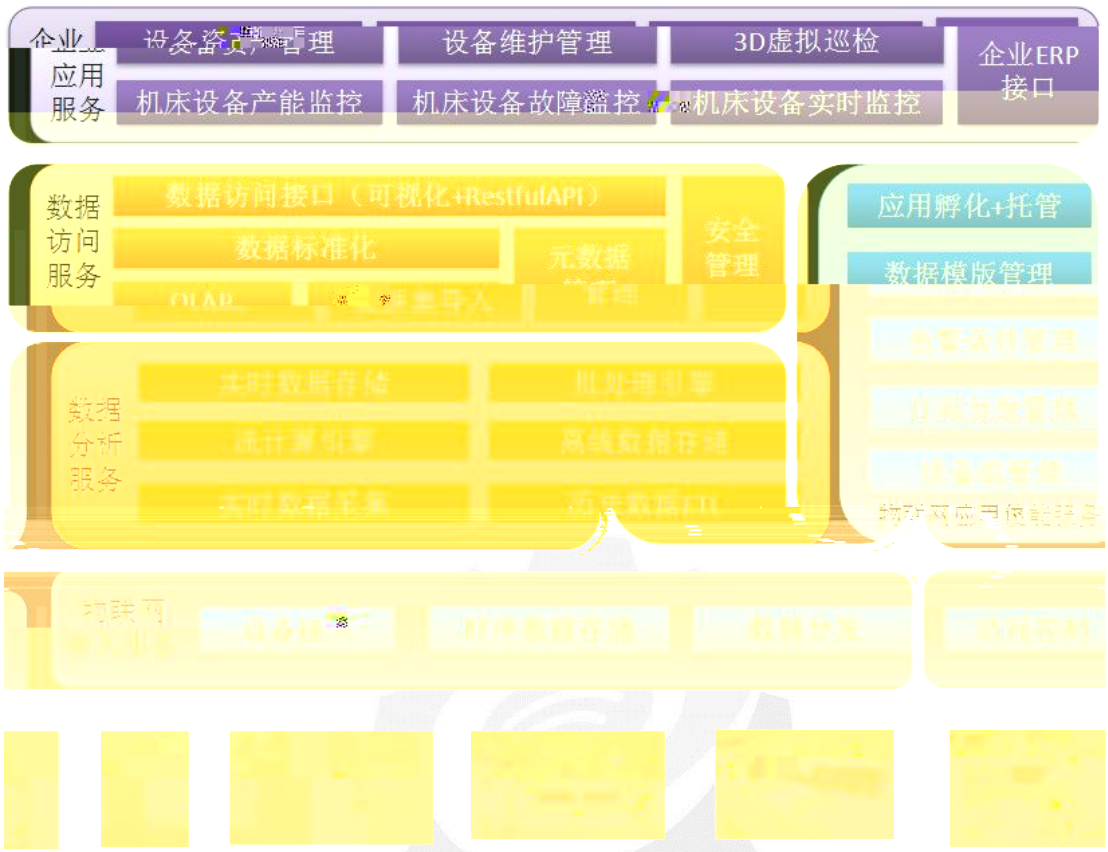

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3D

ERP

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OneNET

EDP OneNET

OneNET

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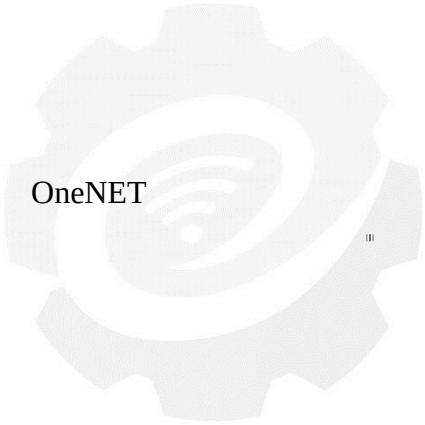
Hadoop Spark ETL

OneNET

ERP

OneNET

OneNET



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LEAP

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LEAP AI

LEAP HD LEAP Edge Server LEAP DataHub LEAP DataGov LEAP Trusted

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ERP CRM MES SCM PLM

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LEAP

LEAP

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LEAP

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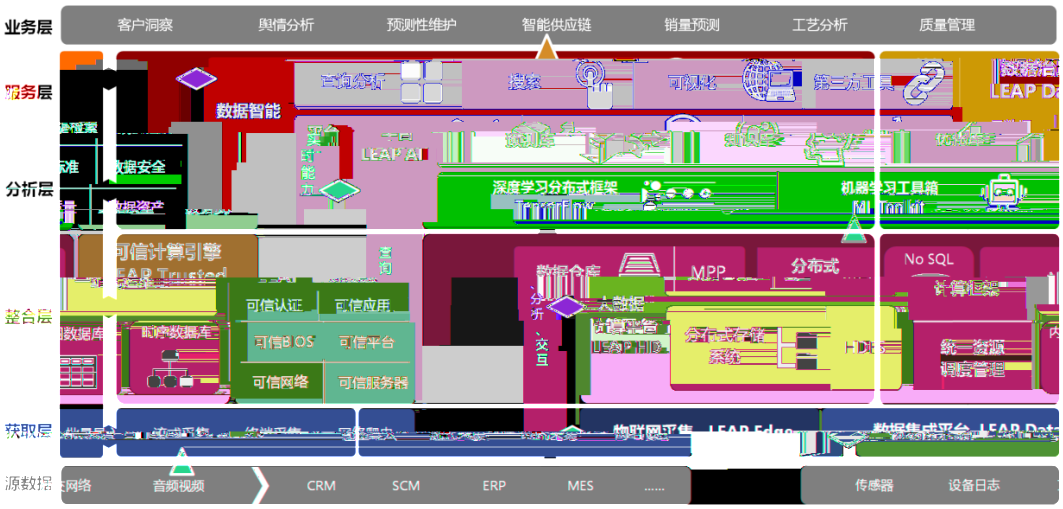
LEAP

LEAP



与

2 LEAP DataHub

LEAP DataHub

ETL(

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LEAP DataHub 50 /

ETL

3 LEAP EDGE

LEAP EDGE

LEAP EDGE

4 LEAP HD

LEAP HD

Hadoop/Spark

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LEAP HD

5 LEAP AI

LEAP AI

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6 LEAP DataGov

LEAP DataGov

7 LEAP Trusted

LEAP Trusted

TPM/TCM Server BIOS OS

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<30% 6

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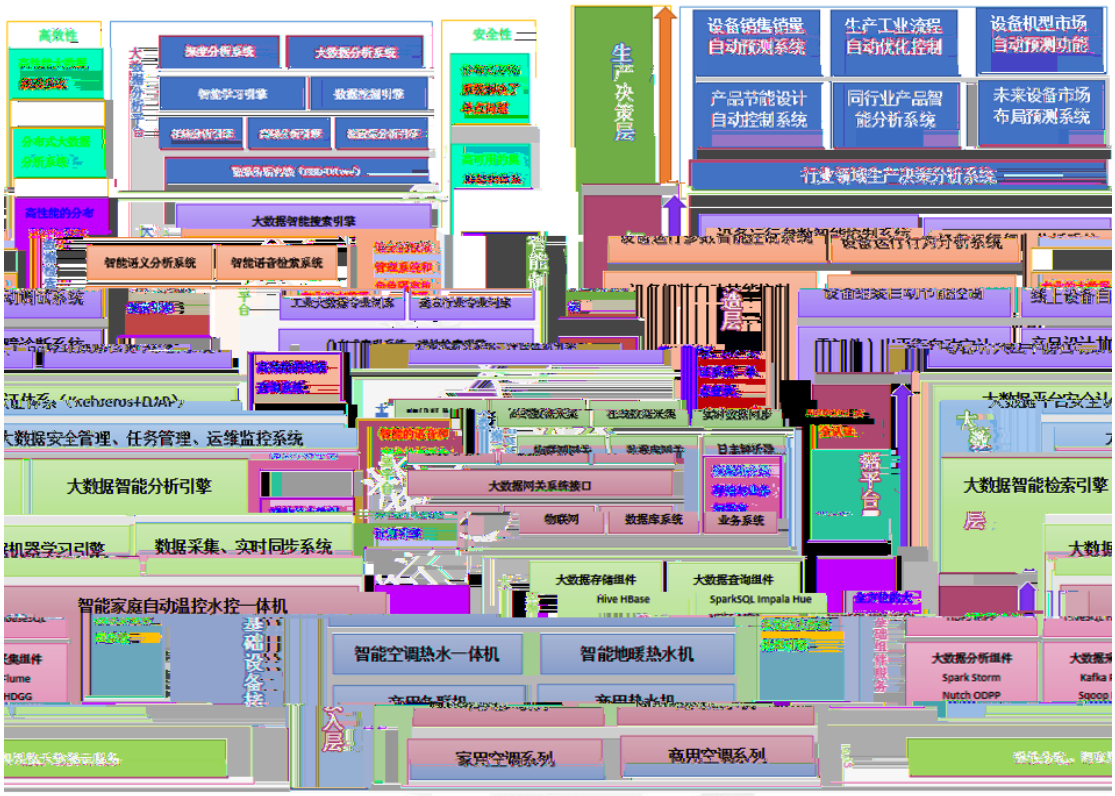
ERP MES

8.66 / 5.65G/

9.58 / 6.25G/



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kafka

Apache Flume

Hadoop

(HDFS) HDFS

Hbase Hadoop YARN

Spark MapReduce

Mahout Spark MLib Spark SQL

Spark GraphX

Flume

HDFS

Flume spooling source 500ms

(2)Sqoop

Sqoop Hadoop

Hadoop HDFS HDFS

Sqoop

Hadoop Sqoop Hadoop

(3)Kafka

Kafka

Hadoop

Kafka Hadoop

Kafka Spark

Streaming Spark Streaming Hbase Mysql

2

KPI

Mahout Spark MLlib Hadoop

Hadoop MapReduce

MapReduce , Map Reduce

,

MapReduce ,

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New SQL

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HTK JuliusJS mmseg4J

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ISO/TC110

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APP

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CAN TCP/IP

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SCADA MES ERP

a)

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APP

APP

APP

+ 2025

3)

IOT IOT

IOT

CPS Cyber-Physical Systems

CPS CPS

NoSQL

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APP

APP ERP

PLM HCM BPM

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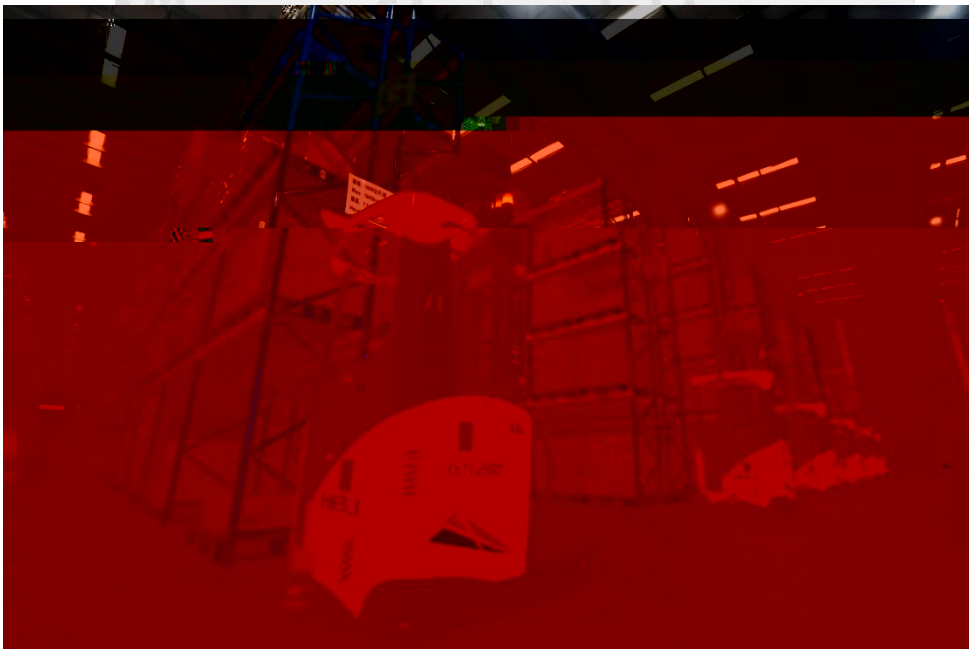
ERP WMS MES



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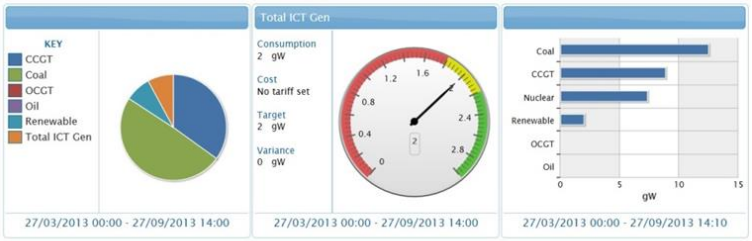

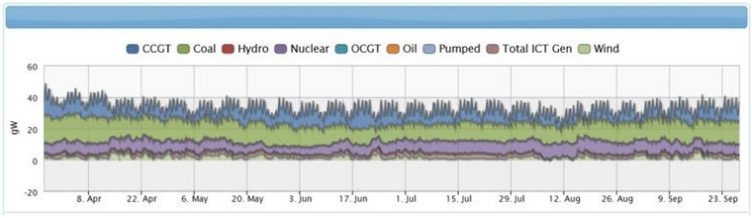

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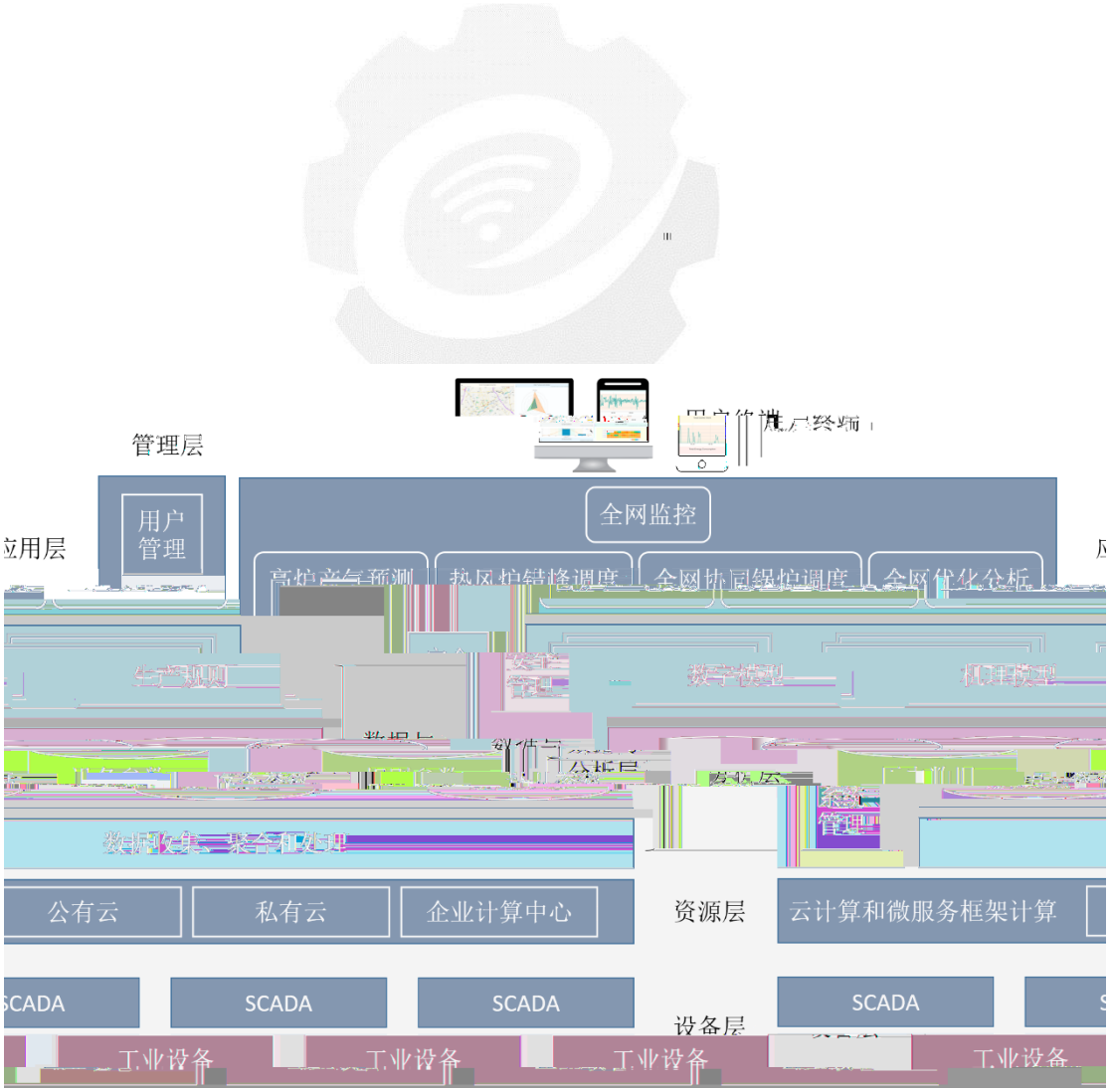
管理层
用户管理
全网监控
公有云
私有云
企业计算中心
资源层
云计算和微服务框架计算
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[2] . 1.0 [R].2017

[3] . 1.0 [R].2017

[4] , , , . [M]. :
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AMQP	Advanced Message Queuing Protocol	
APS	Advanced Planning and Scheduling	
CAD	Computer Aided Design	
CAE	Computer Aided Engineering	
CAM	computer Aided Manufacturing	
CAPP	Computer Aided Process Planning	
CRM	Customer Relationship Management	
DDS	Direct Digital Synthesizer	
DCS	Distributed Control System	
EMS	Environmental Managemental8 219.53 36.504 reW	

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MQTT	Message Queuing Telemetry Transport	
MSMQ	MicroSoft Message Queuing	
OA	Office Automation	
PCS	Process Control System	
PDM	Product Data Management	
PLC	Programmable Logic Controller	
PLM	product lifecycle management	
RFID	Radio Frequency Identification	
SCADA	Supervisory Control And Data Acquisition	
SCM	Supply Chain Management	
SQL	Structured Query Language	
WMS	Warehouse Management System	
XMPP	Extensible Messaging and Presence Protocol	

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