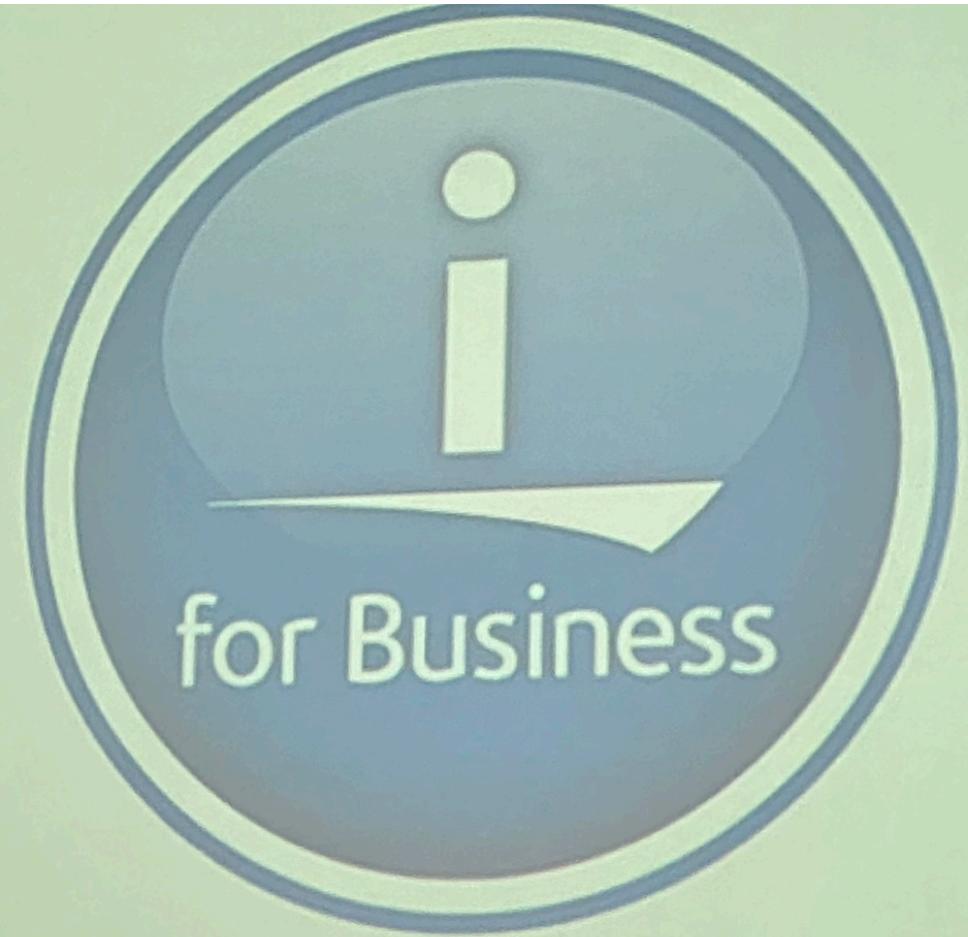


基础坚实，持续创新

- Db2 – 整合数据分析, 安全以及基于SQL的系统管理与服务接口
- 为应用开发注入更多的创新 – 现代化 RPG以及开源选项
- 直观简单的系统管理以及在任何操作系统上对IBM i进行访问的能力
- 为数据中心或者云服务提供可靠, 安全, 信息追踪, 容量扩展等能力



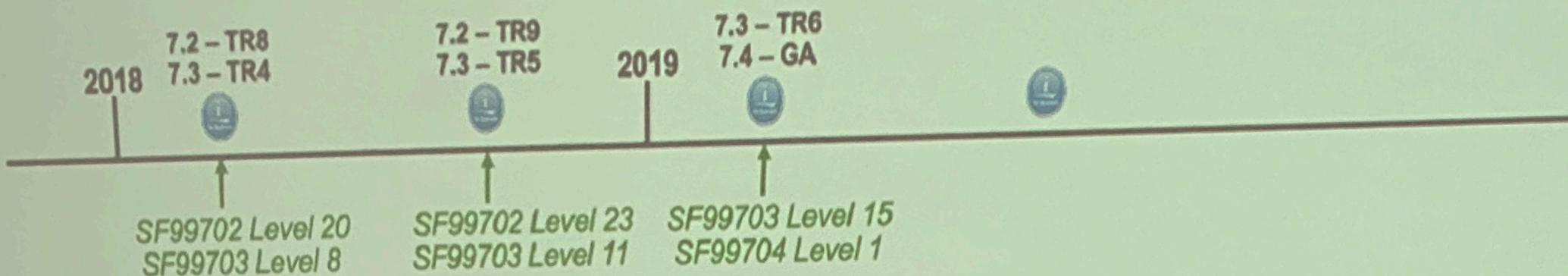
数据库



STUDY
TCDR

通过Db2 PTF Group进行的更新

Speaking: YUN WANG



Enhancements timed with TR5 & TR9

- RPG Embedded SQL Enhancements
- New and Enhanced SQL built-in functions
- New and Enhanced IBM i Services
- Additional Database features in ACS
- SQL Language Improvements
- OmniFind Text Search enhancement
- And more...

Enhancements timed with IBM i 7.4 GA & TR6

- **IBM Db2 Mirror for i**
- **Authority Collection for objects**
- **RPG Embedded SQL Enhancements**
- **New and Enhanced IBM i Services**
- **Additional Database features in ACS**
- **SQL Language Improvements**
- **And more...**

www.ibm.com/developerworks/ibmi/techupdates/db2/grouptf



7.3 开始支持 : 时态表 (Temporal Tables)

通过使用时态表和生成列(Generated Column), 我们可以:

- 查询两年前的销售代表?

```
SELECT CLIENT_REP FROM ACCOUNTS  
FOR SYSTEM_TIME AS OF CURRENT_TIMESTAMP - 2 YEARS
```



- 生成基于不同时间点的存货报告单

```
SET CURRENT TEMPORAL SYSTEM_TIME '2016-03-22 17:00:00';  
CALL GENERATE_INVENTORY_REPORT();
```

- 谁删除了那条记录?

```
SELECT AUDIT_USER, AUDIT_JOB FROM SALES  
FOR SYSTEM_TIME FROM CURRENT_DATE - 1 MONTH TO CURRENT_DATE  
WHERE AUDIT_OP = 'D'
```

- 谁最后更新的那条记录?

```
SELECT AUDIT_USER, AUDIT_CLIENT_IP FROM ITEM_FACT  
WHERE ITEM_KEY = '125A16'
```



之前：用户自己维护历史表

Speaking: YUN WANG

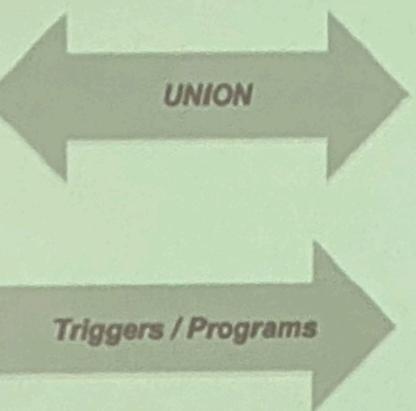
Accessing Data
• SELECT



Accessing Data
• SELECT



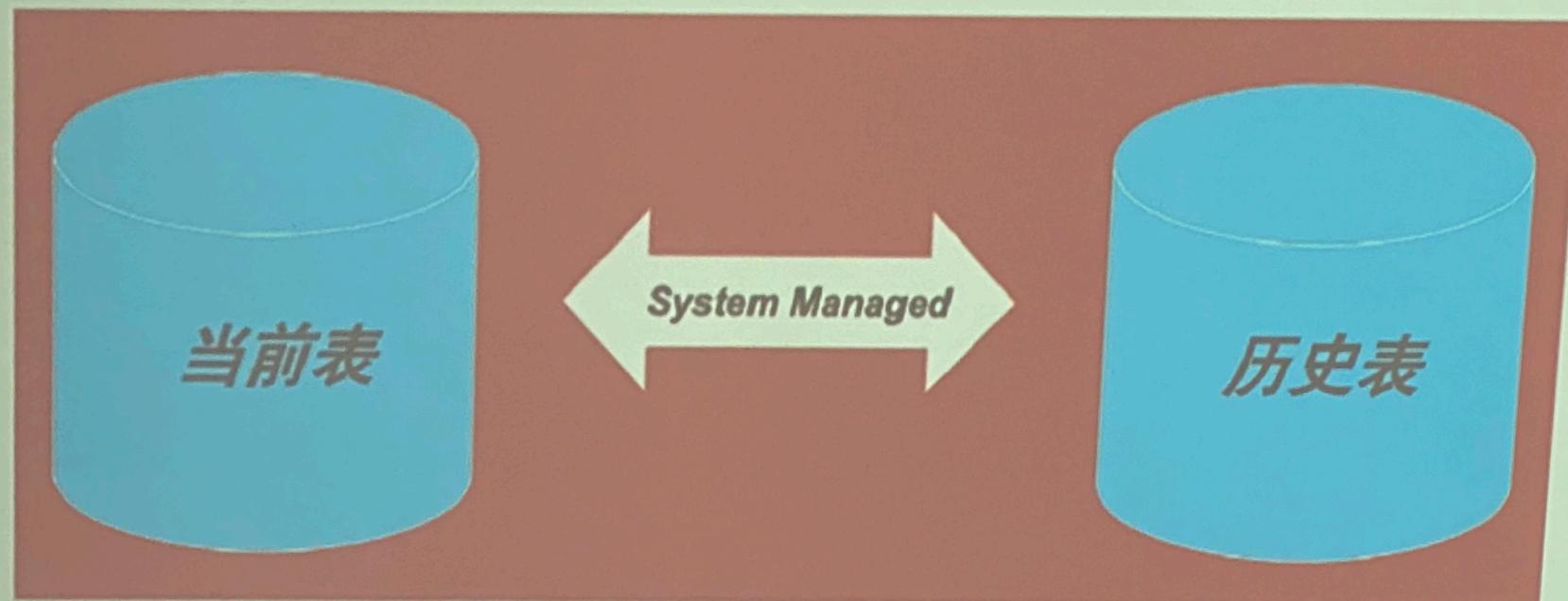
Modifying Data
• INSERT
• UPDATE
• DELETE



Modifying Data
• INSERT
• UPDATE
• DELETE

IBM i 7.3: 时态表 – 整合的Db2方案维护历史表

Accessing Data
• SELECT



Modifying Data
• INSERT
• UPDATE
• DELETE

Accessing Data
• SELECT

Modifying Data
• INSERT
• UPDATE
• DELETE (DBE Only)



时态表 – 构建时态表

> Speaking: YUN WANG

```
ALTER TABLE account
```

```
ADD COLUMN instance_begin
```

```
TIMESTAMP(12) NOT NULL GENERATED ALWAYS AS ROW BEGIN
```

```
ADD COLUMN instance_end
```

```
TIMESTAMP(12) NOT NULL GENERATED ALWAYS AS ROW END
```

```
ADD COLUMN transaction_id
```

```
TIMESTAMP(12) GENERATED ALWAYS AS TRANSACTION START ID
```

```
ADD PERIOD SYSTEM_TIME (instance_begin, instance_end)
```

Establish birth/death of a row

```
CREATE TABLE account_hist LIKE account
```

Create history table

```
ALTER TABLE account ADD VERSIONING USE HISTORY TABLE  
account_hist
```

Enable Temporal tracking

IBM i 7.3: 增强的审计功能 - 生成列

Speaking: YUN WANG

- DB2按照生成列的定义为用户获取各种审计信息
 - 这条记录是什么时候更新的? (现有功能: `row-change-timestamp-clause`)
 - 生成列表达式 (IBM i 7.3的新功能)
- 生成列表达式包括:
 - `DATA CHANGE OPERATION (I/U/D)`
 - `Special register`
 - `Built-in Global Variable`

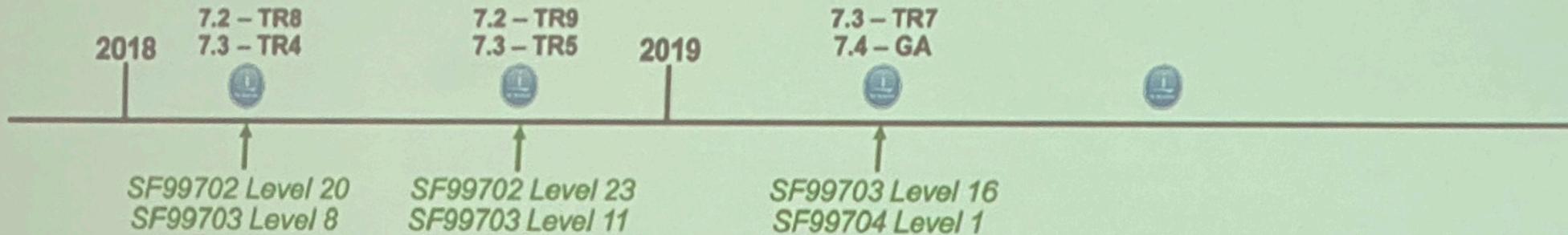
```
ALTER TABLE FACT_table
ADD COLUMN audit_type_change CHAR (1)
GENERATED ALWAYS AS (DATA CHANGE OPERATION)
ADD COLUMN audit_user VARCHAR(128)
GENERATED ALWAYS AS (SESSION_USER)
ADD COLUMN audit_client_IP VARCHAR(128)
GENERATED ALWAYS AS (SYSIBM.CLIENT_IPADDR)
ADD COLUMN audit_job_name VARCHAR(28)
GENERATED ALWAYS AS (QSYS2.JOB_NAME)
```

special-register

```
+--CURRENT CLIENT_ACCTNG-----+
+--CURRENT CLIENT_APPLNAME-----+
+--CURRENT CLIENT_PROGRAMID-----+
+--CURRENT CLIENT_USERID-----+
+--CURRENT CLIENT_WRKSTNNAME-----+
+--CURRENT SERVER-----+
'--+SESSION_USER-----+
'--USER-----'
```

built-in-global-variable

```
+--QSYS2.JOB_NAME-----+
+--QSYS2.SERVER_MODE_JOB_NAME-----+
+--SYSIBM.CLIENT_HOST-----+
+--SYSIBM.CLIENT_IPADDR-----+
+--SYSIBM.CLIENT_PORT-----+
+--SYSIBM.PACKAGE_NAME-----+
+--SYSIBM.PACKAGE_SCHEMA-----+
+--SYSIBM.PACKAGE_VERSION-----+
+--SYSIBM.ROUTINE_SCHEMA-----+
+--SYSIBM.ROUTINE_SPECIFIC_NAME-----+
'--SYSIBM.ROUTINE_TYPE-----'
```



Services in 4Q/2017:

- Syslog detail returned from DISPLAY_JOURNAL & HISTORY_LOG_INFO
- ASP_INFO
- ASP_VARY_INFO
- JOB_QUEUE_INFO
- STACK_INFO
- And more...

Services in 3Q/2018:

- JOB_DESCRIPTION_INFO
- ACTIVE_JOB_INFO enhancements
- NETSTAT_INFO & NETSTAT_JOB_INFO enhancements
- And more...

Services in 2Q/2019:

- DATA_AREA_INFO
- ASP_JOB_INFO
- MESSAGE_FILE_DATA
- SYSTOOLS.FIRMWARE_CURRENCY
- SYSTOOLS.SPLIT
- SYSTOOLS.SPOOLED_FILE_DATA
- IBM i 7.4 only services
- And many enhanced services

<http://ibm.biz/Db2foriServices>



7.3 对OLAP的增强 - 基于现有数据，获取对业务新的认知

Speaking: YUN WANG

- 在市场推广上增加投资能提高销售总收入吗？
- 如果可以，基于市场推广的现有投资，是否可以对未来销售量做一个预期？

在 7.3 & DB2 OLAP 功能出现之前

- 无法在IBM i上做类似查询。

或者：

- 将数据从IBM i平台迁移到其它平台，再基于迁移后的数据进行分析

或者：

- 使用Cognos 连接 IBM i

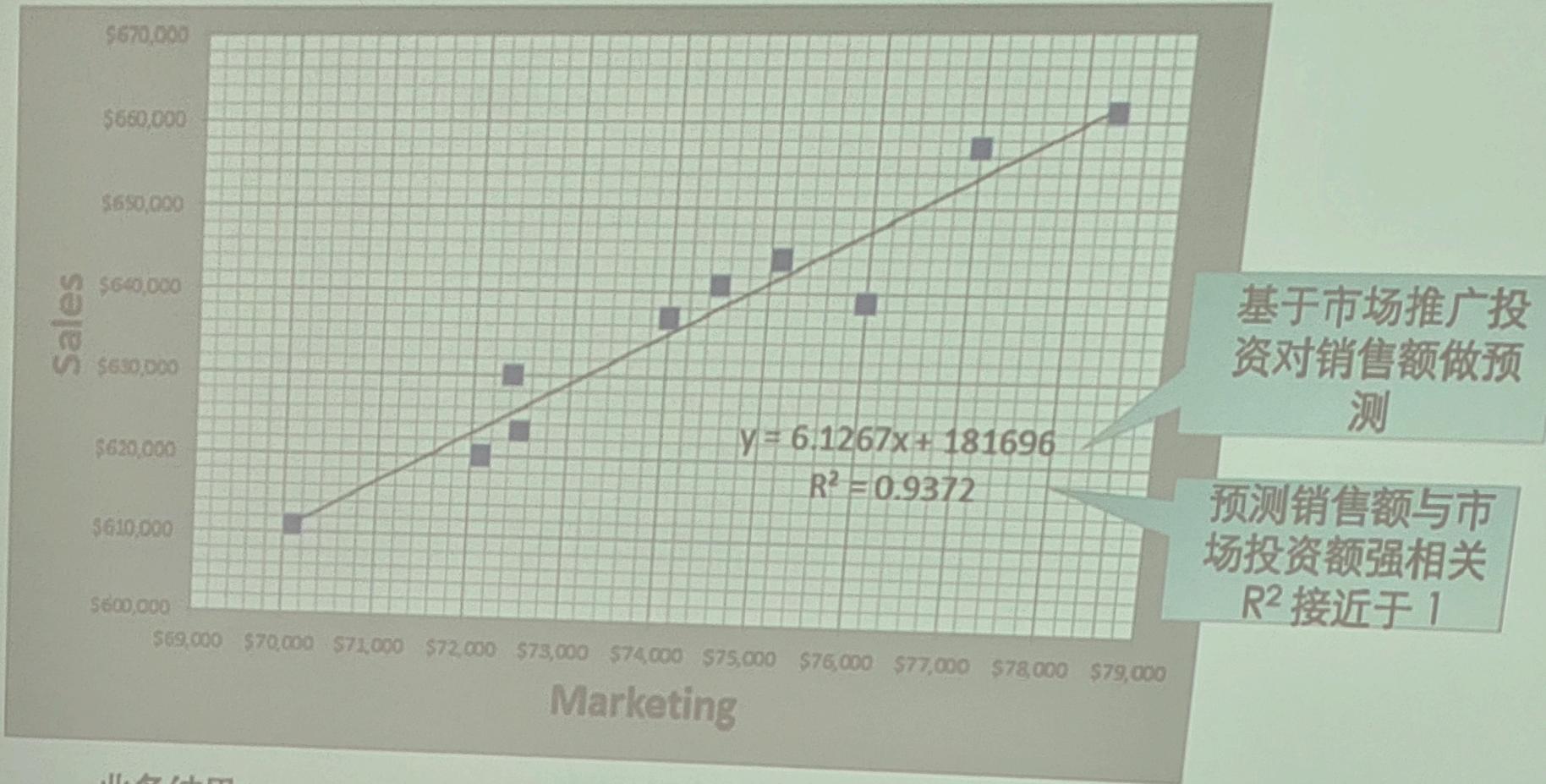


如果使用 7.3 和 DB2 OLAP 功能：

- 集成的数据分析功能
- 直接在IBM i上做数据分析，不需要拷贝一份数据
- Cognos 对IBM i做处理变得更快！

7.3 - SQL 查询引擎与OLAP 功能扩展

Speaking: YUN WANG



业务结果:

- ```
SELECT REGR_SLOPE (sales, mktg), REGR_INTERCEPT (sales, mktg)
 FROM salesdata ;
```
- ```
SELECT POWER ( CORRELATION ( sales, mktg ), 2 )
  FROM salesdata ;
```

7.3 - SQL Query Engine and OLAP Specification

Option	Description
Aggregates	Returns the aggregate value (SUM, COUNT...) for the OLAP window
LAG or LEAD	Returns the value computed using rows prior to or following the current row.
NTILE	Specifies the quantile rank of a row within the window in which it is computed.
NTH_VALUE	Returns the value for the nth row in an OLAP window.
FIRST_VALUE and LAST_VALUE	Returns the first or last value in an OLAP window.
RATIO_TO_REPORT	Returns the ratio of an argument to the sum of the arguments in an OLAP window.
CUME_DIST	Returns the relative position of a specified value in a group of values.
CORRELATION	Returns the coefficient of correlation of a set of number pairs
COVARIANCE	Returns the (population) covariance of a set of number pairs..
COVARIANCE_SAMP	Returns function returns the unbiased sample covariance (n-1) of a set of number pairs.
PERCENTILE_CONT	Is an inverse distribution function that assumes a continuous distribution model. It takes a percentile value and a sort specification, and returns an interpolated value that would fall into that percentile value with respect to the sort specification.
PERCENTILE_DISC	Is an inverse distribution function that assumes a discrete distribution model. It takes a percentile value and a sort specification and returns an element from the set.
MEDIAN	Takes a numeric or datetime value and returns the middle value or an interpolated value that would be the middle value once the values are sorted. Median is a form of PERCENTILE_CONT.
REGR_COUNT	Returns the number of non-null number pairs used to fit the regression line.
REGR_INTERCEPT	Returns the y-intercept of the regression line.
REGR_R2	Returns the coefficient of determination for the regression.
REGR_SLOPE	Returns the slope of the line.
REGR_AVGX, REGR_AVGY, REGR_SXX, REGR_SXY, REGR_SYY	Returns the quantities that can be used to compute various diagnostic statistics needed for the evaluation of the quantity and statistical validity of the regression model.

权限收集器 (Authority Collection) - 智能的安全保障

> Speaking: YUN WANG



- 小王真的需要 * ALLOBJ的权限去执行某个应用吗？
- 对于系统上跟Hr应用相关的15个对象，管理员应该赋予人力资源部门什么样的权限？
- 如果某个应用需要正确的执行，其所需要的针对于某些对象的最小权限是什么？

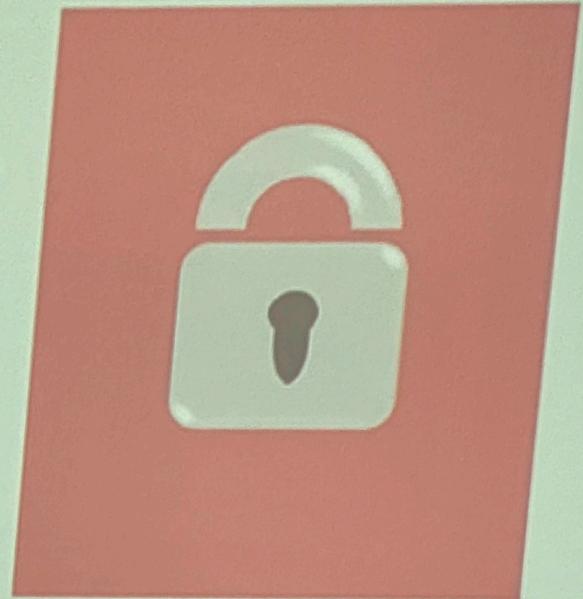
业务问题：

- 是否给某个员工赋予了过多的权限？
- 某个员工的现有权限是什么？
- 要完成某类工作，员工需要的真实权限都有哪些？



功能目标

- IBM i 7.3 - 获取跟特定用户(User profile)相关的权限分配具体信息
- IBM i 7.4 - 提取和收集基于特定对象(Object)的权限检查信息



优势

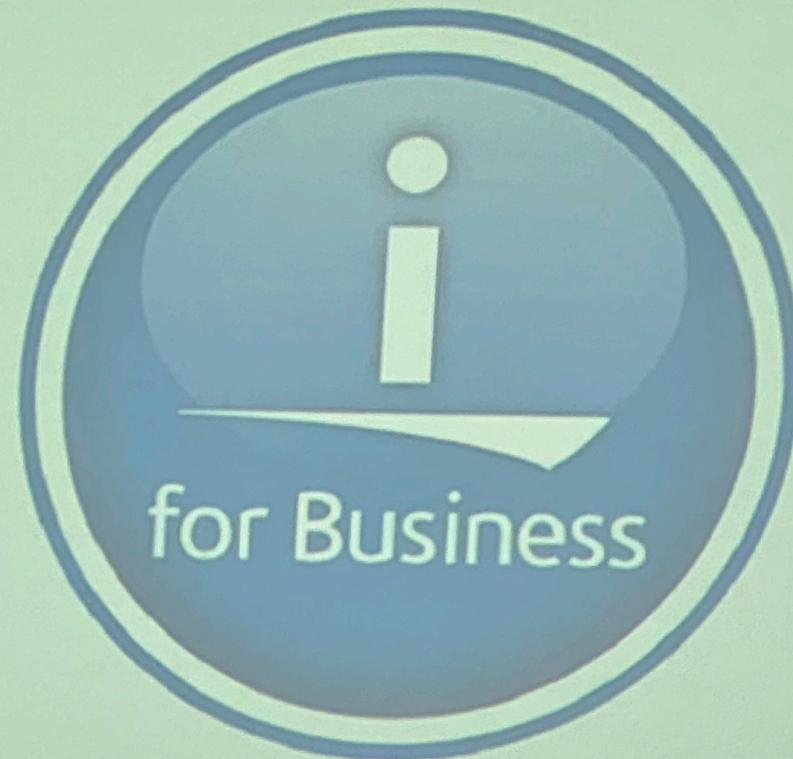
- ❖ 安全的控制与减少过度的权限
- ❖ 在部署新解决方案之前检查权限模型
- ❖ 让您的安全管理员更专业
- ❖ 分析权限相关失败问题
- ❖ 基于对象(Object)的权限收集只支持7.4





Speaking: YUN WANG

IBM i 和云计算

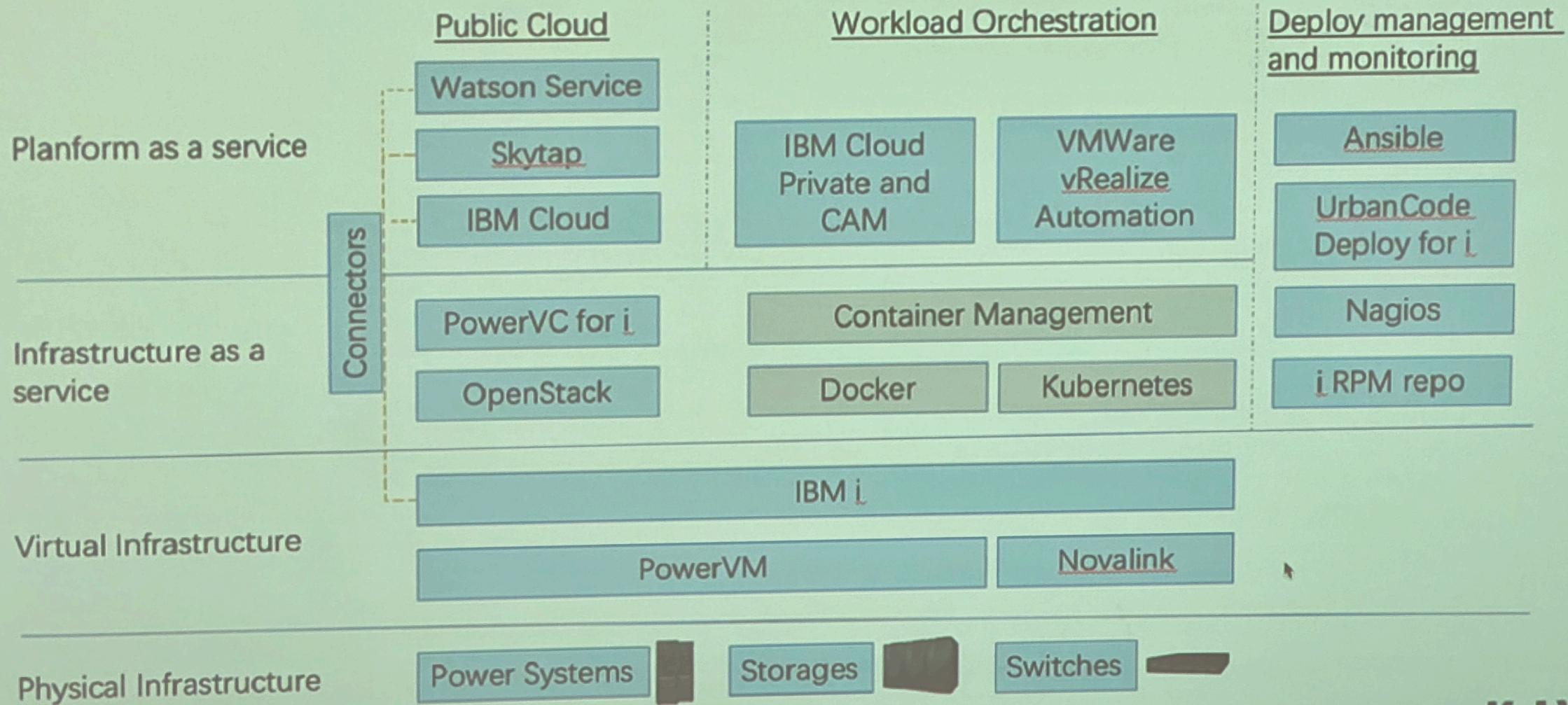


IBM i Cloud Stack

Speaking: YUN WANG

IBM i Enabled

Does Not Support i



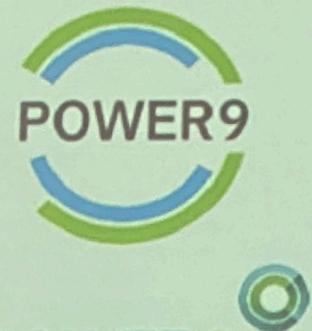
Modernization and Cloud Journey for POWER Customers

Cognitive Systems

"We meet you where you are in your journey and help you move forward at your pace"

> Speaking: YUN WANG

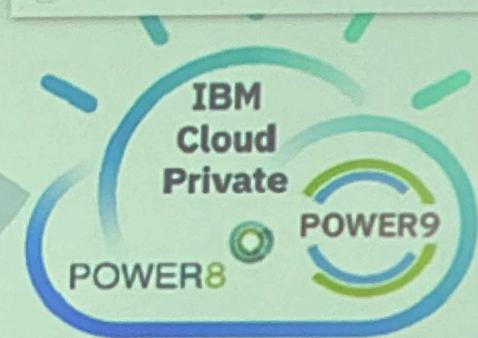
Seamless management of IT infrastructure,
multiple clouds and applications



POWER8

Manage Cloud
Infrastructure
PowerVC Cloud

Create and
Manage Cloud
Native Apps
IBM Cloud Private
/ OpenShift
+ Cloud Automation Mgr.



Manage Hardware and Ops
HMC

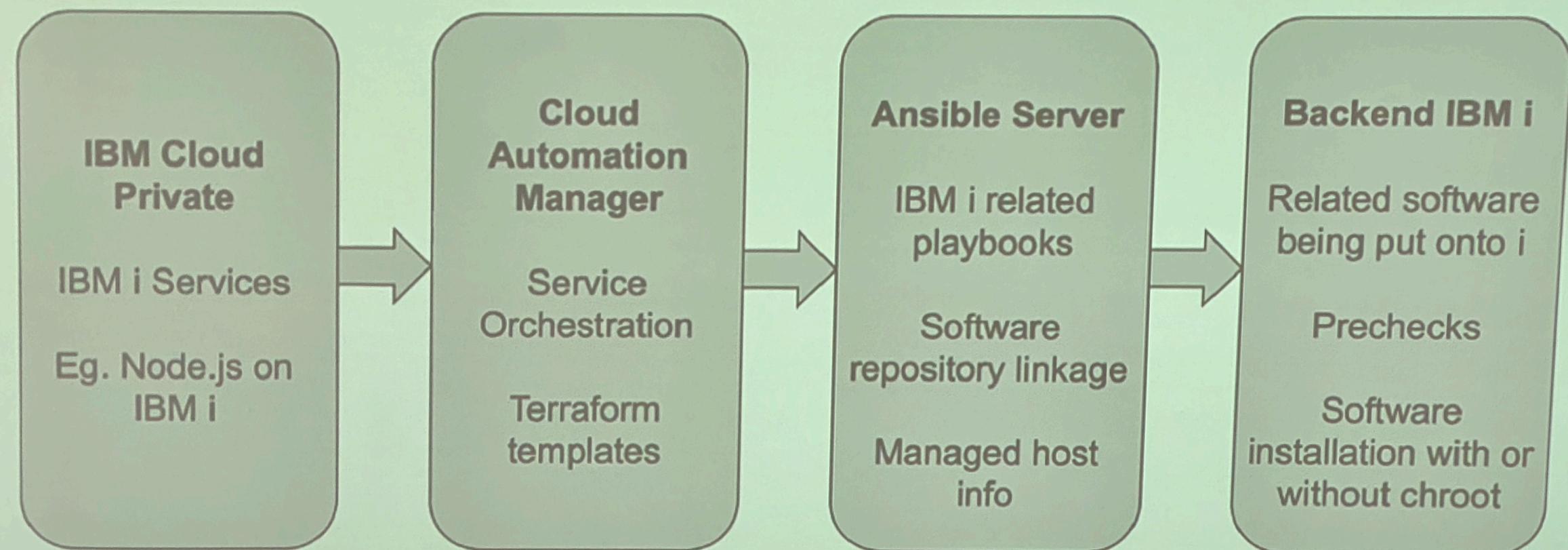
Traditional IT
Infrastructure

- Use PowerVC to manage POWER cloud infrastructure
- Modernize existing apps; build new on POWER, Z and x86
- Securely connect to business critical data and apps
- Provide cloud automation and single self-service portal for AIX and IBM i VMs plus containerized apps

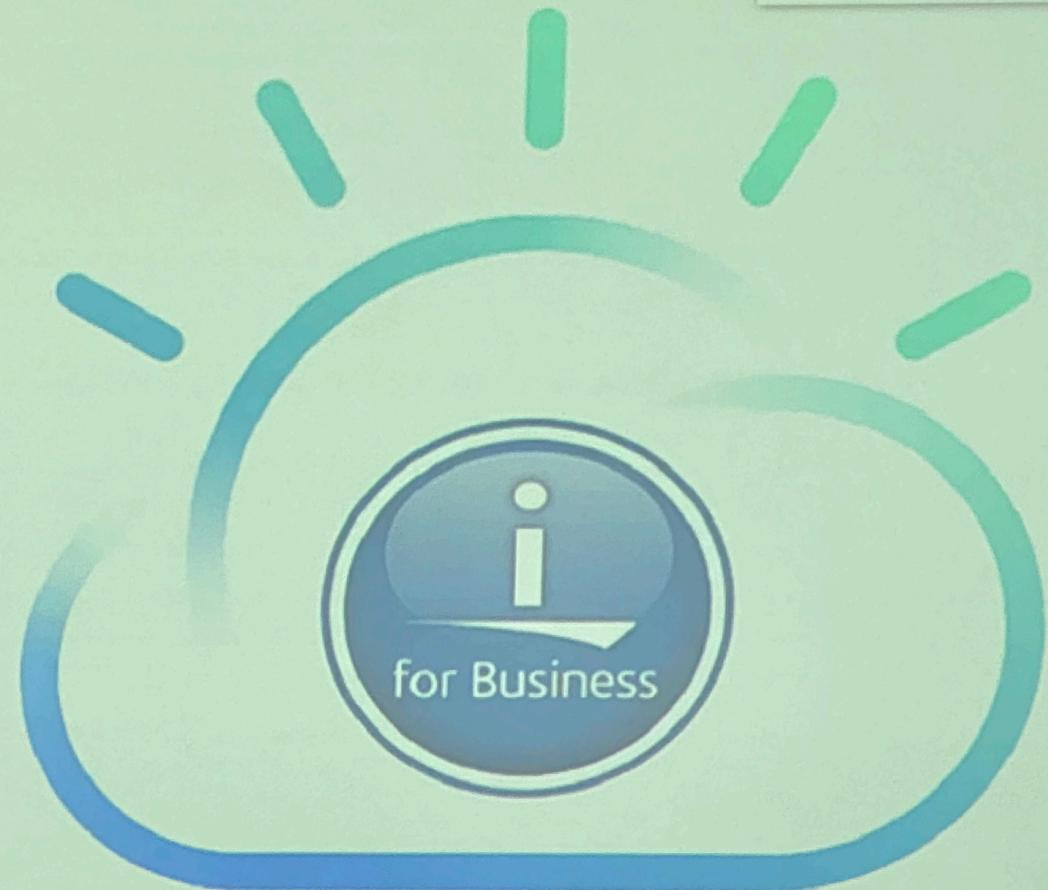


一个利用ICP+CAM+Ansible部署Node.js的背后流程

> Speaking: YUN WANG



IBM POWER9 on IBM Cloud: More Choice and Flexibility, On- Premise and Off

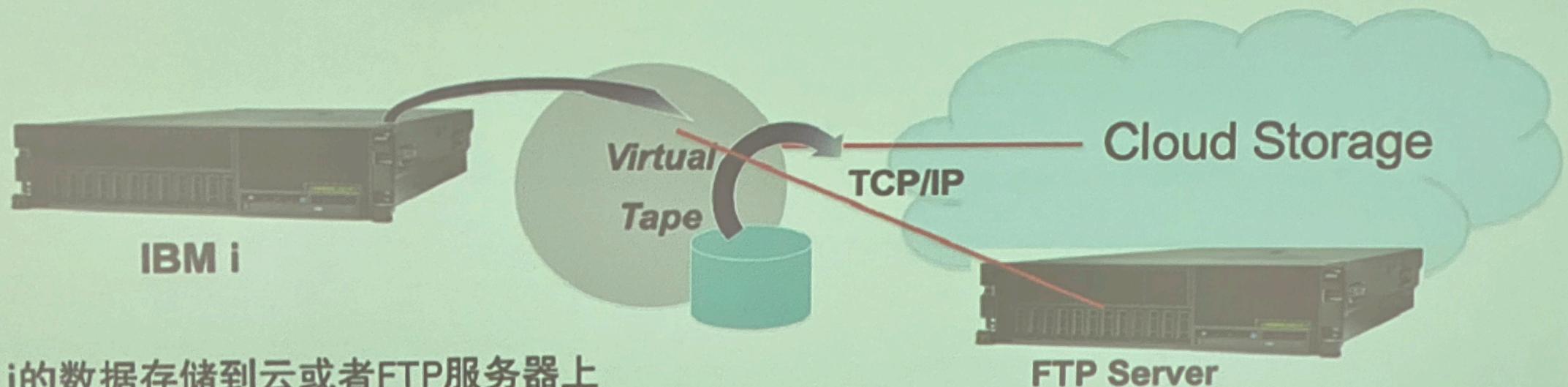


<https://www.ibm.com/blogs/bluemix/2019/02/ibm-power9-on-ibm-cloud/>



IBM Cloud Storage Solutions for i (5733ICC)

> Speaking: YUN WANG

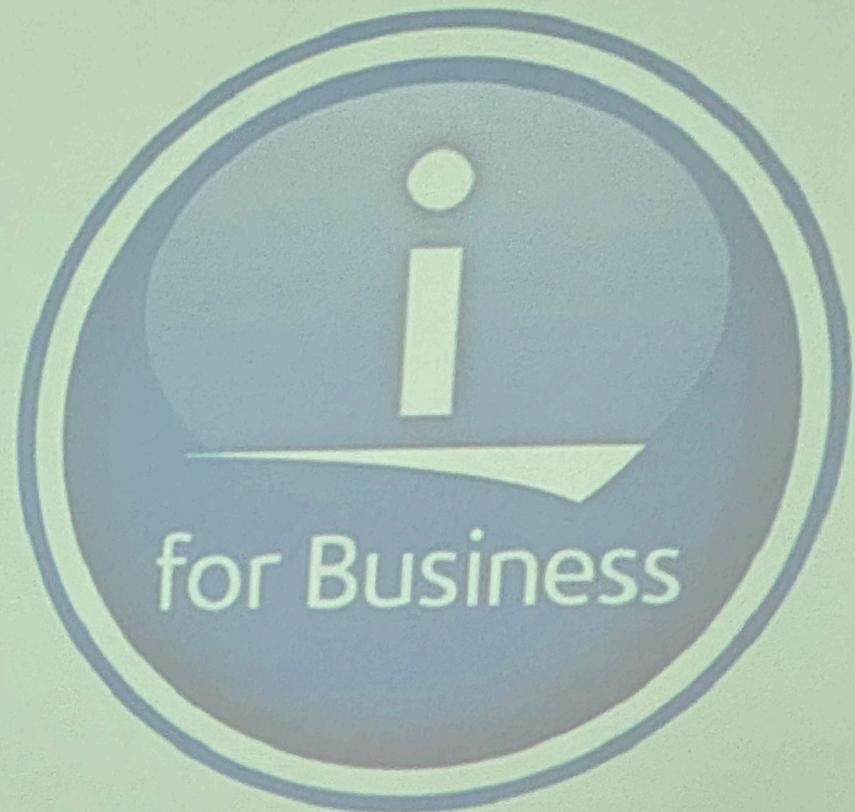


把IBM i的数据存储到云或者FTP服务器上

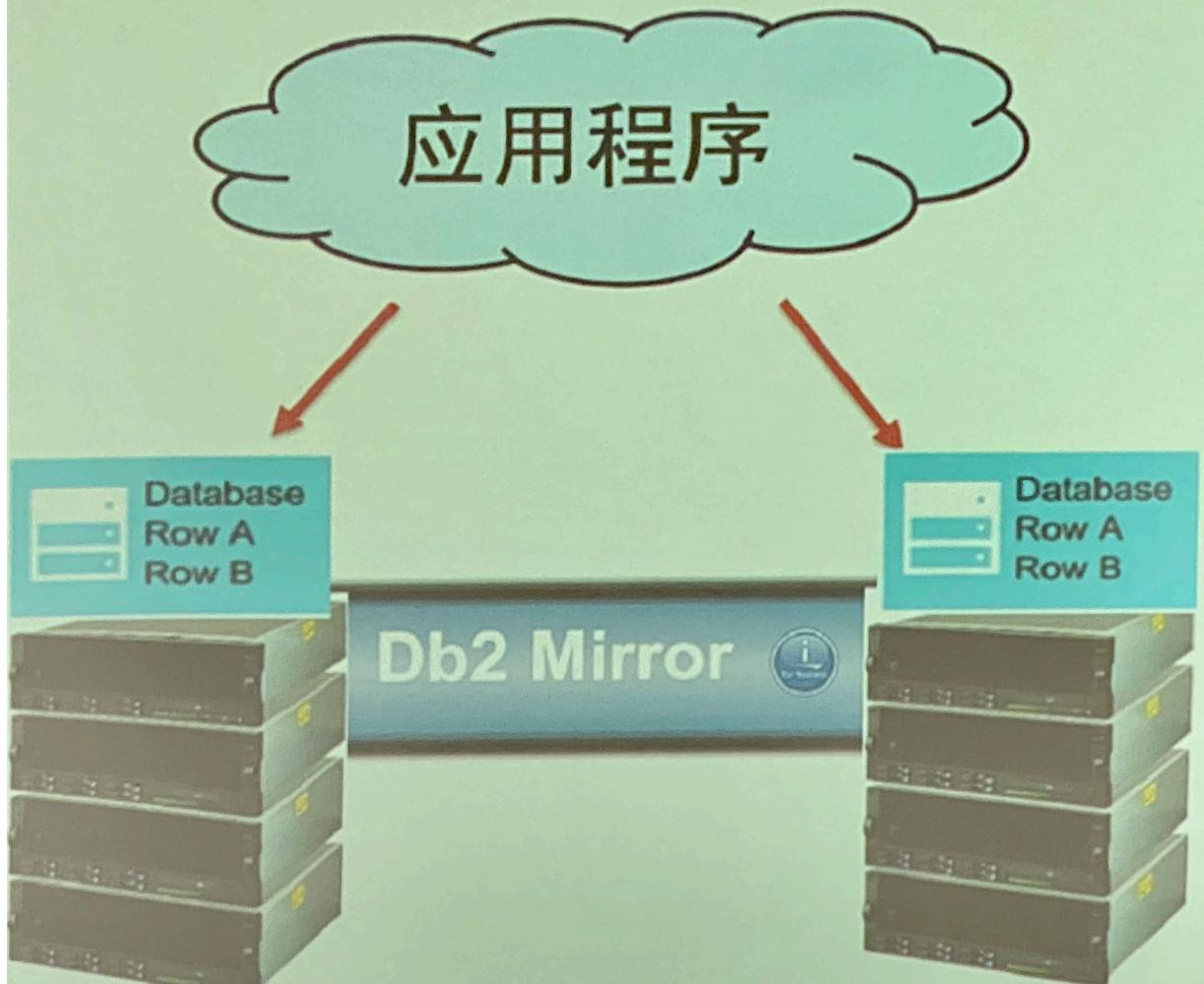
- 支持两种模式
 1. 通过BMRS备份到云上
 2. 通过GUI工具将文件存储到云上

http://www.ibm.com/support/knowledgecenter/ssw_ibm_i_73/icc/topics/iccuoverview.htm

IBM i 业务连续性



IBM Db2 Mirror for i

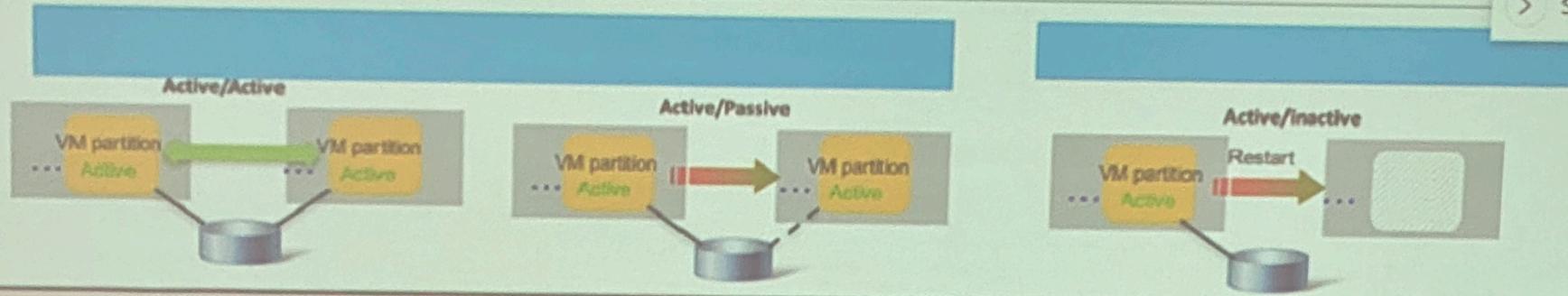


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- **IBM Db2 Mirror for i: 业务连续**
 - 在同一个数据中心的Db2 for i上部署两个节点，实现双活技术
 - 两个节点可以同时读写数据
- **应用程序的高可用**
 - 两个系统上的应用可以同时读写同一个数据文件
 - 快速的将应用切换到某一个正常工作的节点，以应对计划内系统维护以及计划外的宕机事件
- **业务不间断运行，应对各种系统软硬件升级场景**
 - 两个节点可以是不同的操作系统版本
 - 两个节点可以使用不同的Power硬件
 - 系统未来升级不会带来业务中断
 - 如果使用了双活技术，系统升级过程中可以支持回退至前一个版本，并且影响可控

配置最低要求：IBM i 7.4 版本以及Power8
新的许可产品：IBM i LPP 5770DBM

市场上企业级高可用方案比较



技术	Active/Active	Active/Passive	Active/Inactive
定义	应用级别集群： 集群中的应用程序可以同时访问（读和写）生产数据，因此应用程序节点中断时不会重新启动应用程序。某些类型应用根据需要会对辅助节点仅采用只读访问	OS级别集群： 集群中的一个OS可以访问生产数据，集群中所有节点上有多个活动OS实例。在生产节点中断时，在辅助节点上重新启动应用程序。	VM级别集群： 集群对中的一个VM可以访问数据。一个逻辑分区，一个或两个物理系统。在主节点中断事件时，必须在辅助节点上重新启动操作系统和应用程序。LPM使VM可以无中断地移动以进行计划中断事件。
应对中断类型	SW, HW, HA, 计划内, 计划外 RTO 0, 距离受限	SW, HW, HA, DR, 计划内, 计划外, RTO>0, 多数据中心支持	HW, HA, DR, 计划内, 计划外, RTO>0, 多数据中心支持
OS 集成	操作系统层面实现	操作系统层面实现	操作系统不可知
RPO	只有同步技术	同步或者异步技术	同步或者异步技术
RTO	0	分钟级	比较快, 需要Vm重启
许可*	N+N 许可模式	N+1 许可模式	* N+0 许可模式
业界产品举例	Oracle RAC, Db2 Mirror, pureScale	PowerHA, Redhat HA, Linux HA	VMware, VMR HA, LPM,

- N = 集群中每个系统上的许可处理器核心数
- 插图表示双节点共享存储配置，以简化概念。实际情况中，还有许多其他拓扑和数据弹性组合

Db2 Mirror – Active Active

Cognitive Systems

Speaking: YUN WANG

Node 2

Node 1

Add record

App

Database



Name	Age
WY	24

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操作系统层面
负责数据同步

RoCE

数据同步在两个系
统上做更改
(SYSBAS 或 IASP)

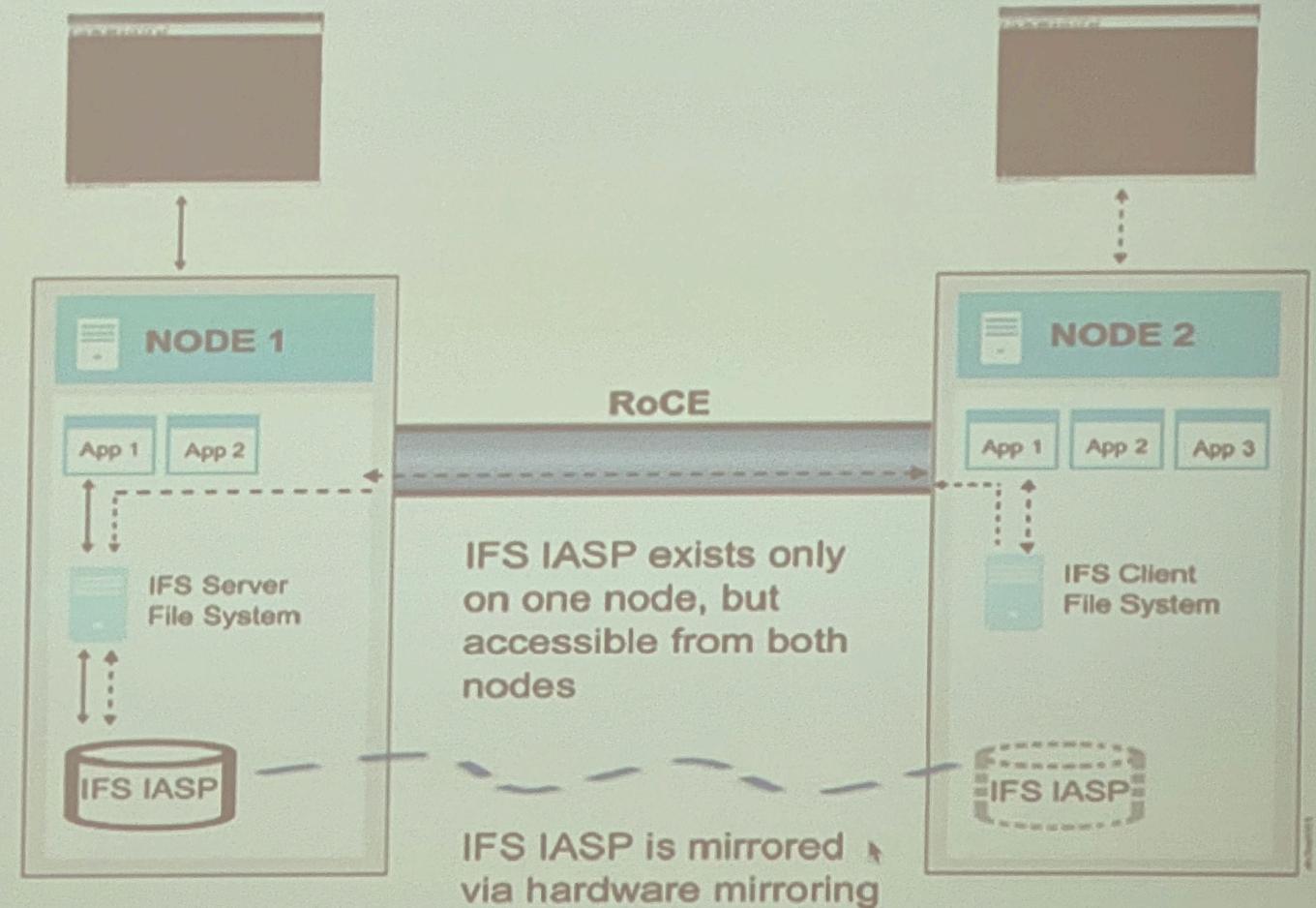
Name	Age
WY	24

STUDY
ICDR

26

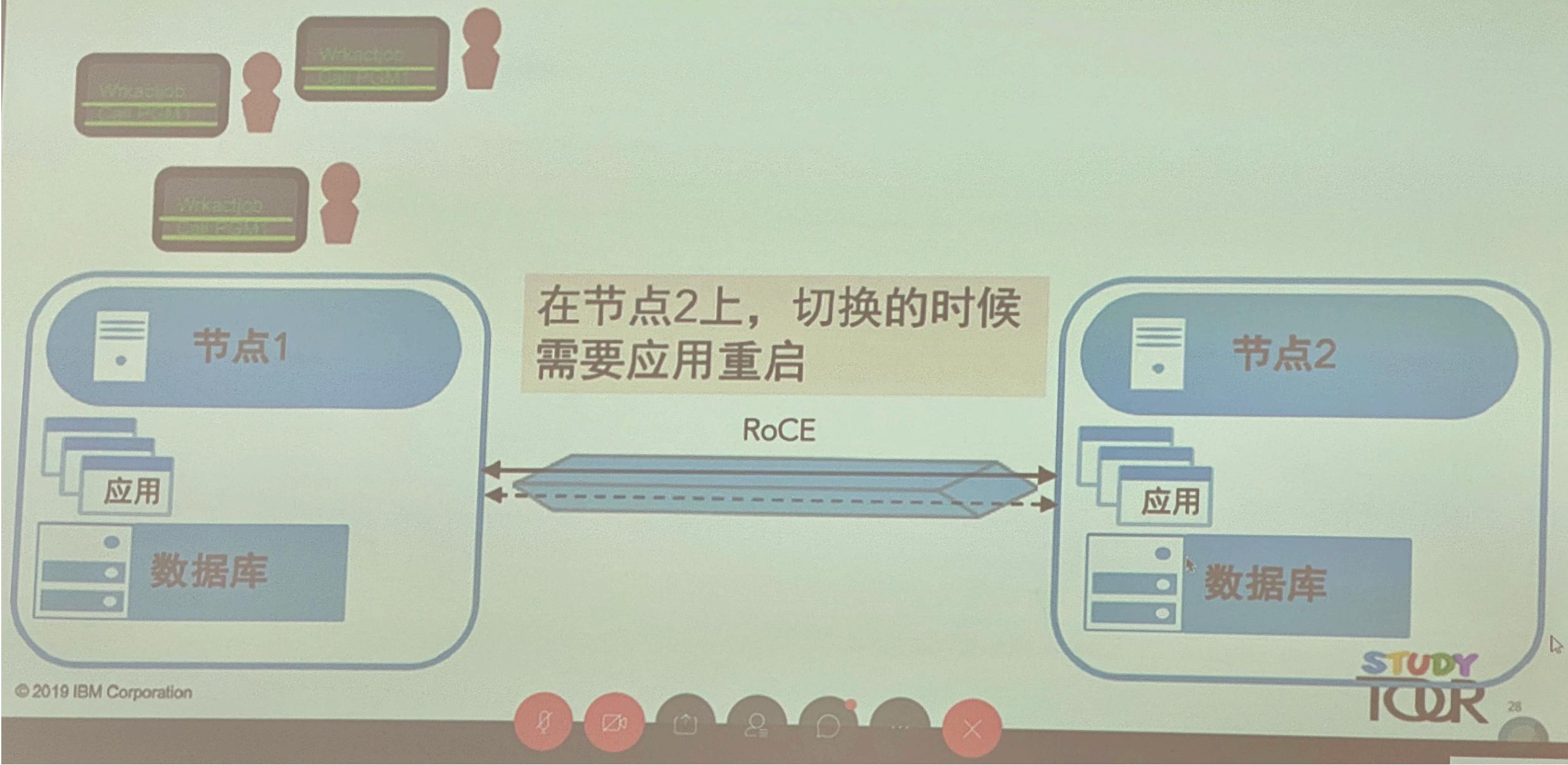
Db2 Mirror对IFS的支持

- 需要使用IASP
- 两个系统都可以同时读写IFS
- 需要安装PowerHA
- 当IASP切换时，文件系统自动切换

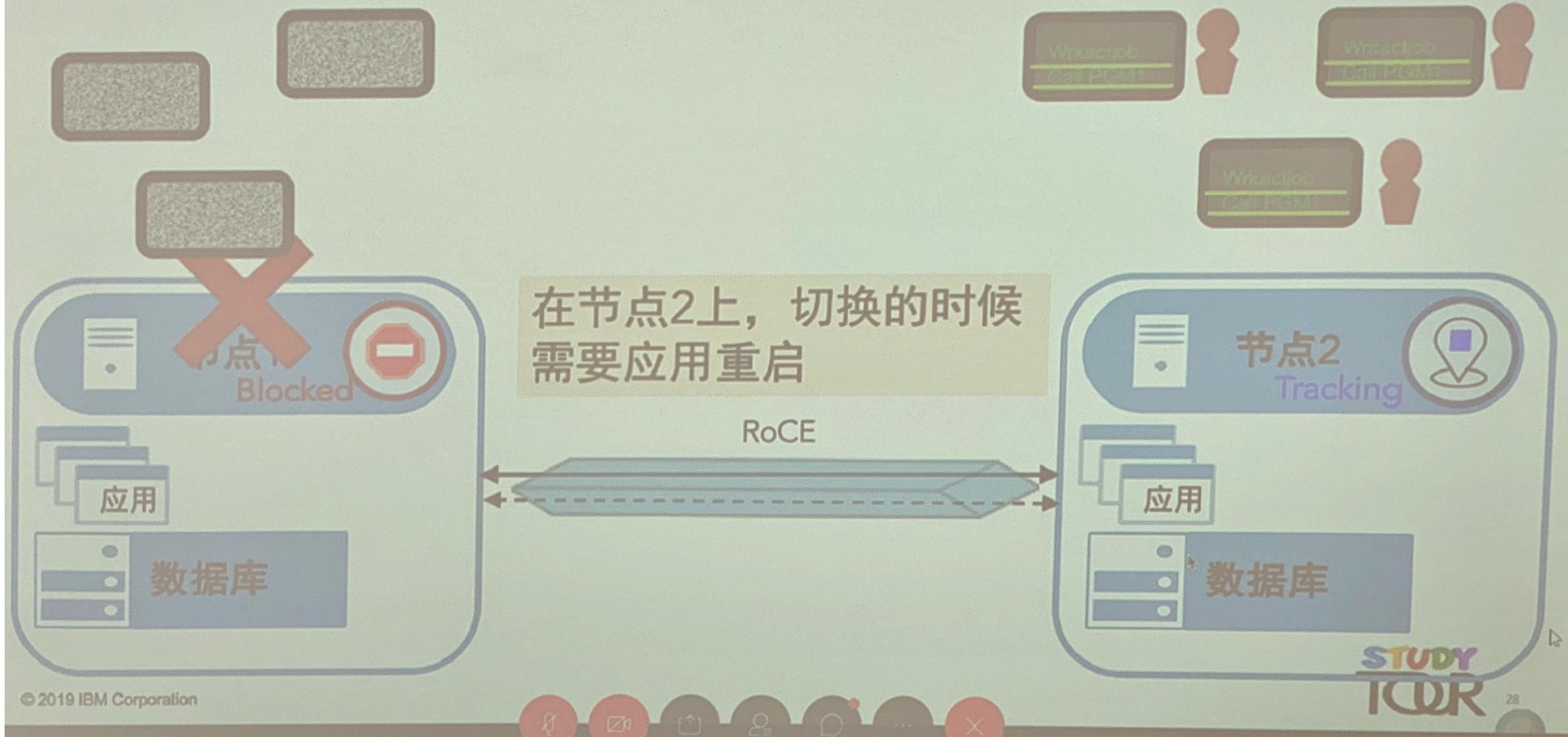




Db2 Mirror 方案架构 – 双活，绿屏应用程序



Db2 Mirror 方案架构 – 双活，绿屏应用程序

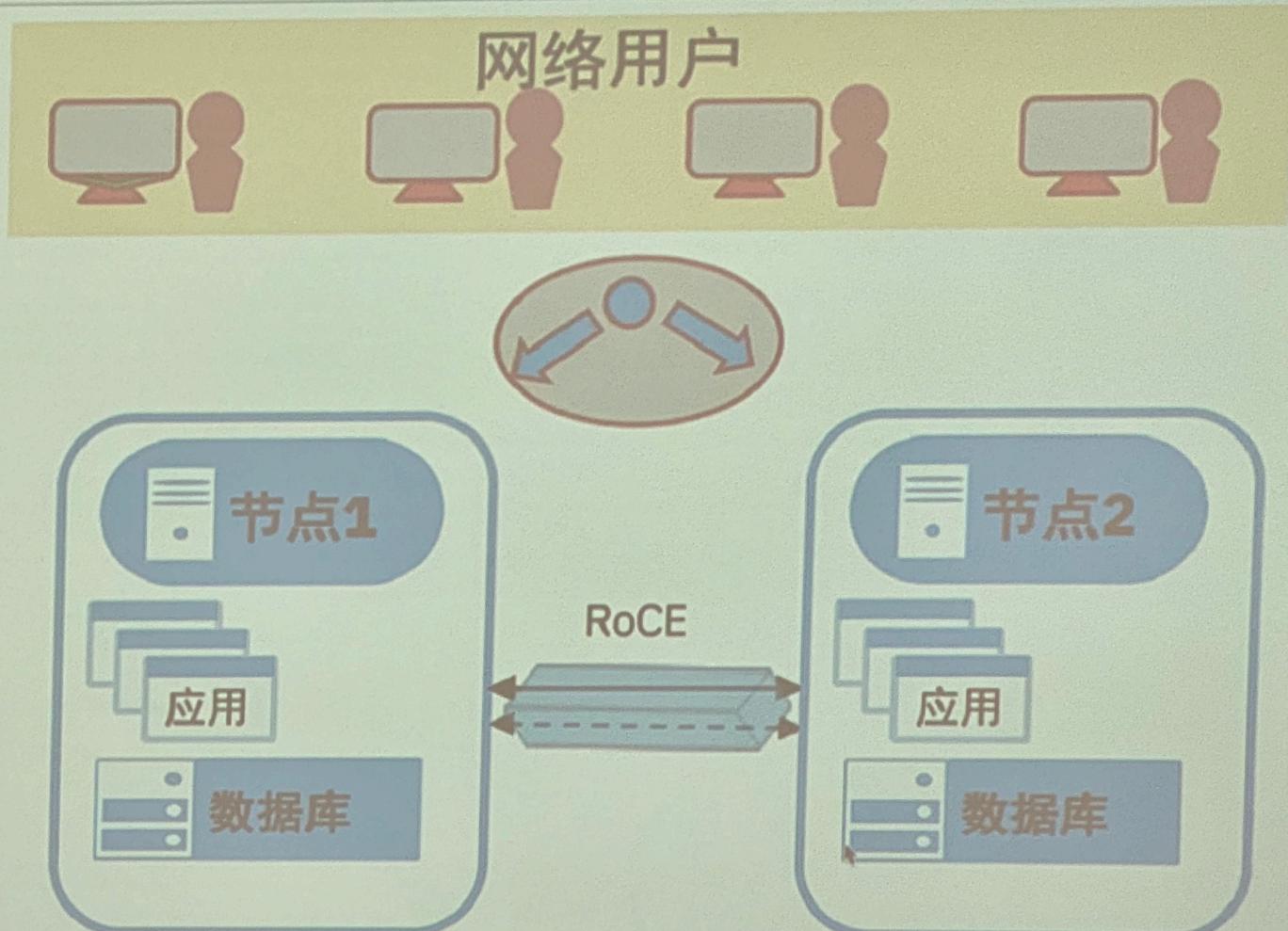




Db2 Mirror 方案架构 - 双活，用户从外围网络发起请求

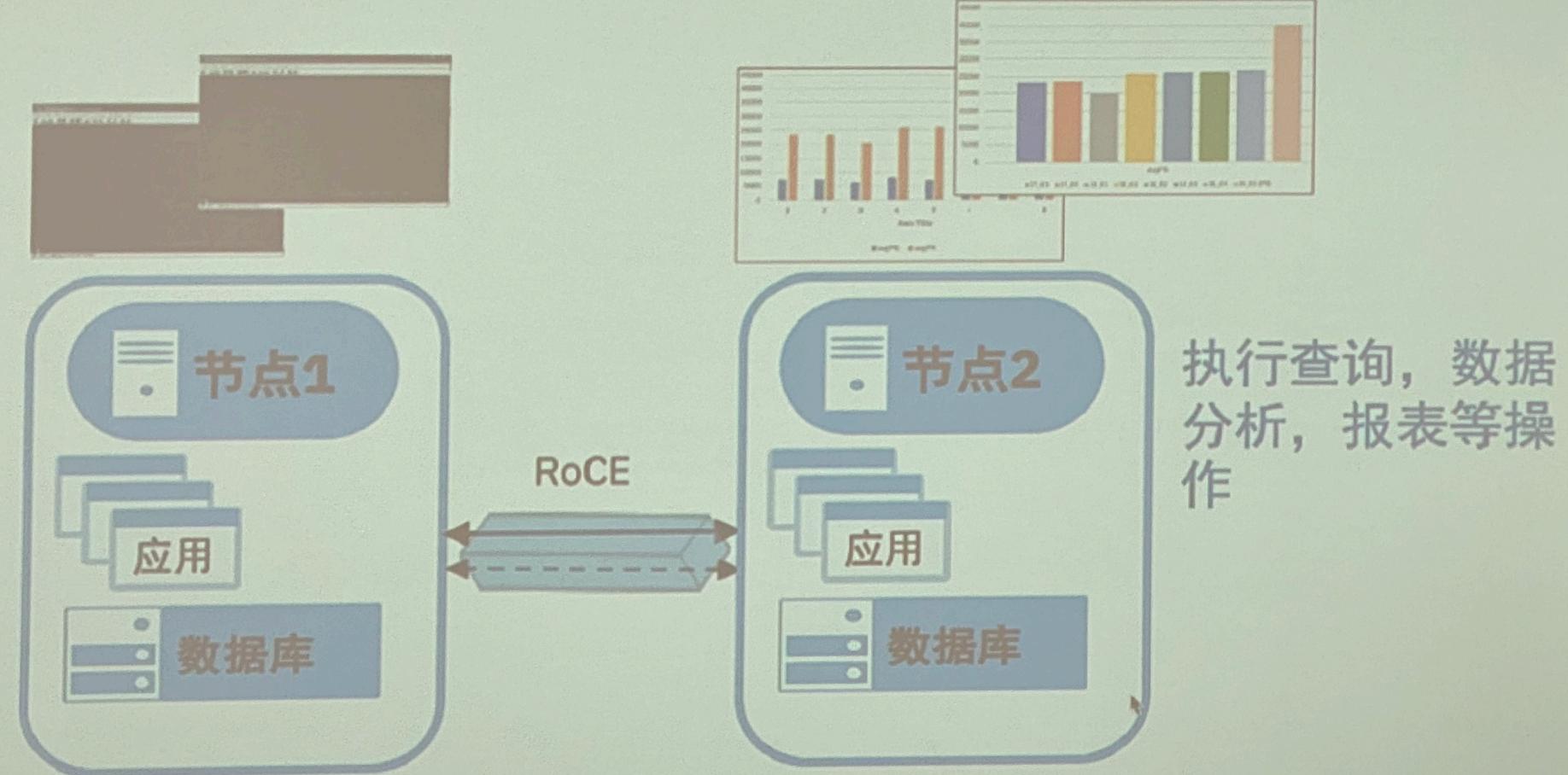
外围应用通过JDBC
或者负载均衡器的方
法连接到IBM I

7.4 JTOpen JDBC
支持不掉线的情况下
切换数据库连接



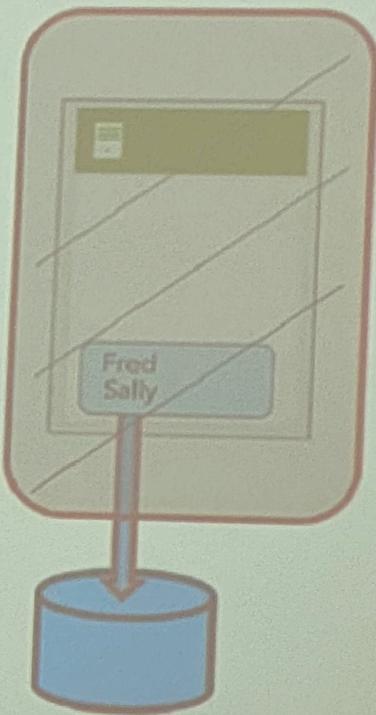
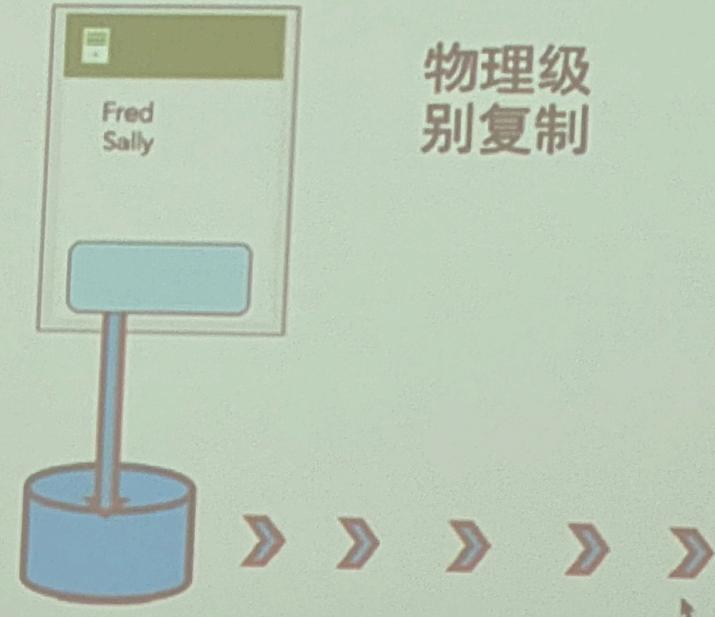
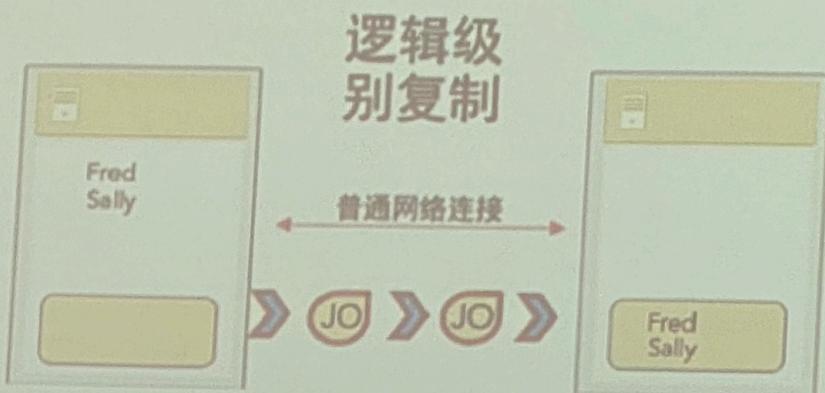


生产主程序和作
业在主节点上执
行

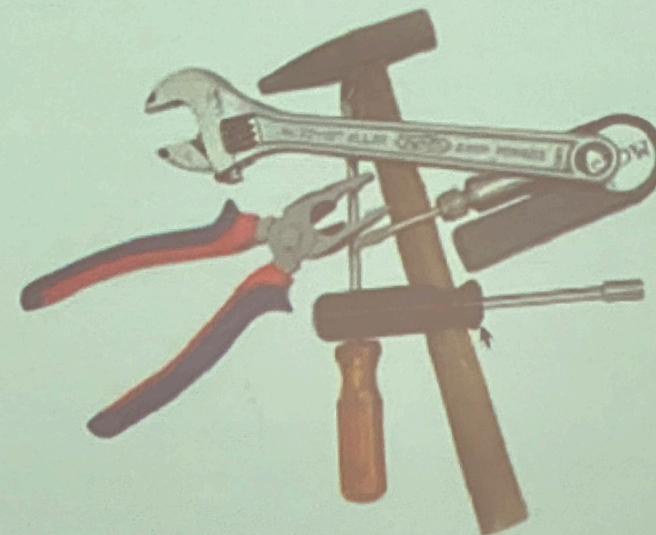
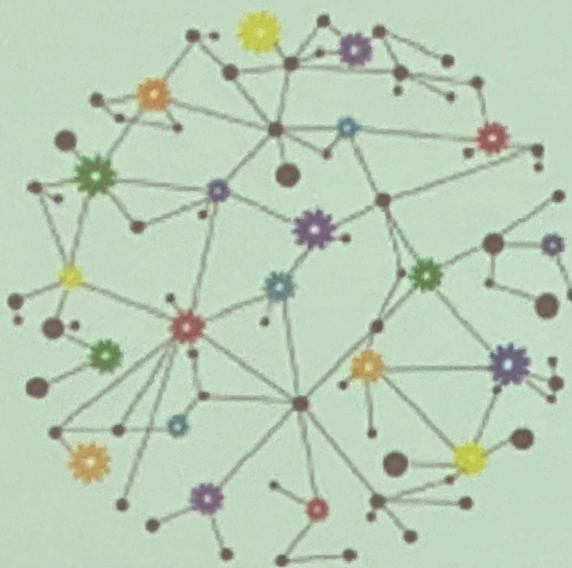


Db2 Mirror – 跟市场上其他技术的区别

- IBM i 操作系统负责数据的复制
- 跟市场上任何的IBM i HA技术都不一样
- 可以跟市场上的其他HA/Dr技术配合使用

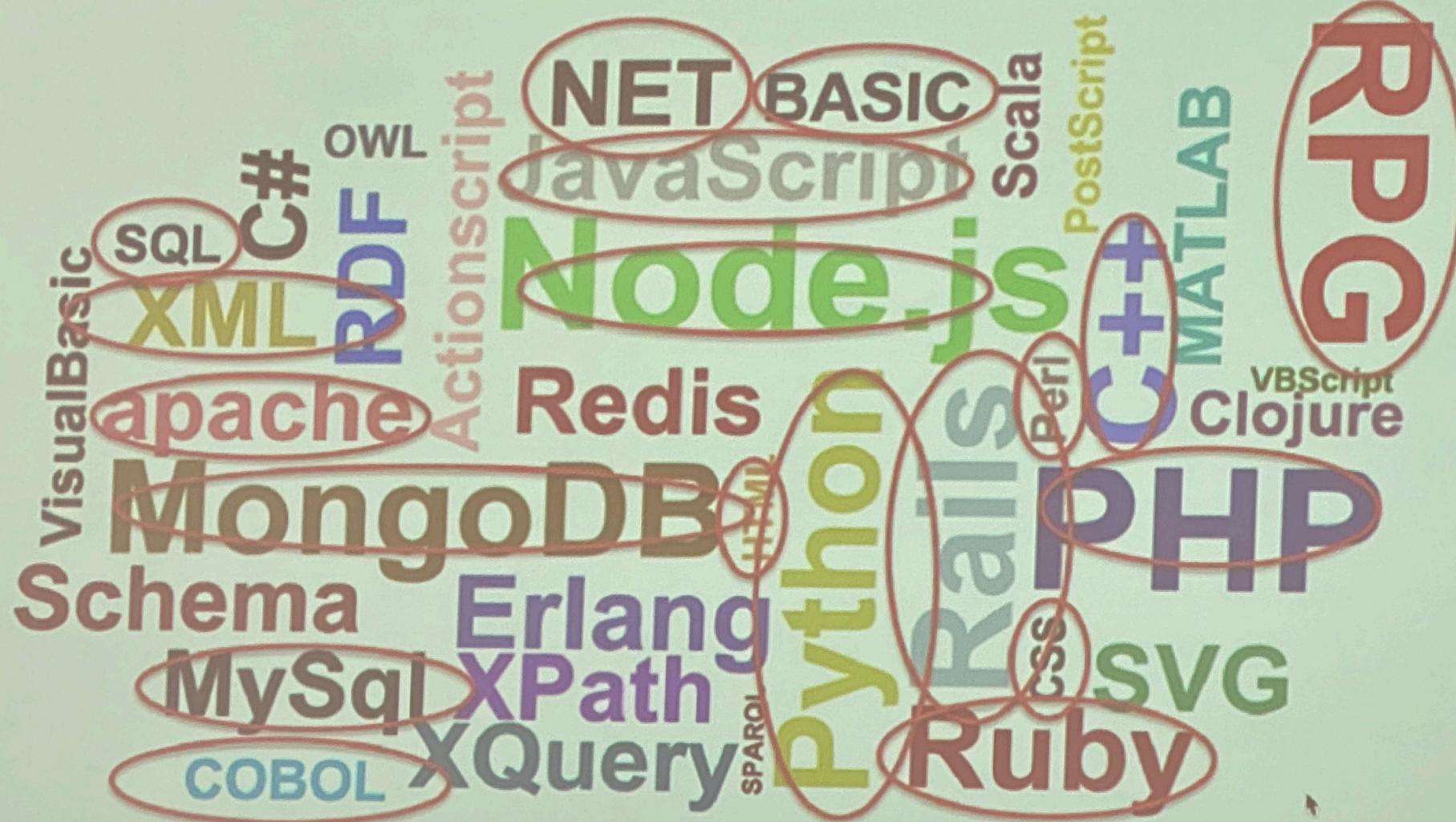


- 开发语言
 - 开发工具
 - IBM i的应用连接
 - 开发人员



A word cloud visualization where the size and position of words represent their frequency or importance. The most prominent words are Node.js, Python, and MongoDB. Other visible words include C#, .NET, BASIC, JavaScript, Redis, MySQL, Schema, XPath, XQuery, Erlang, Ruby, PHP, Clojure, Perl, C++, MATLAB, VimScript, Scala, and many others.

IBM i上现代编程语言

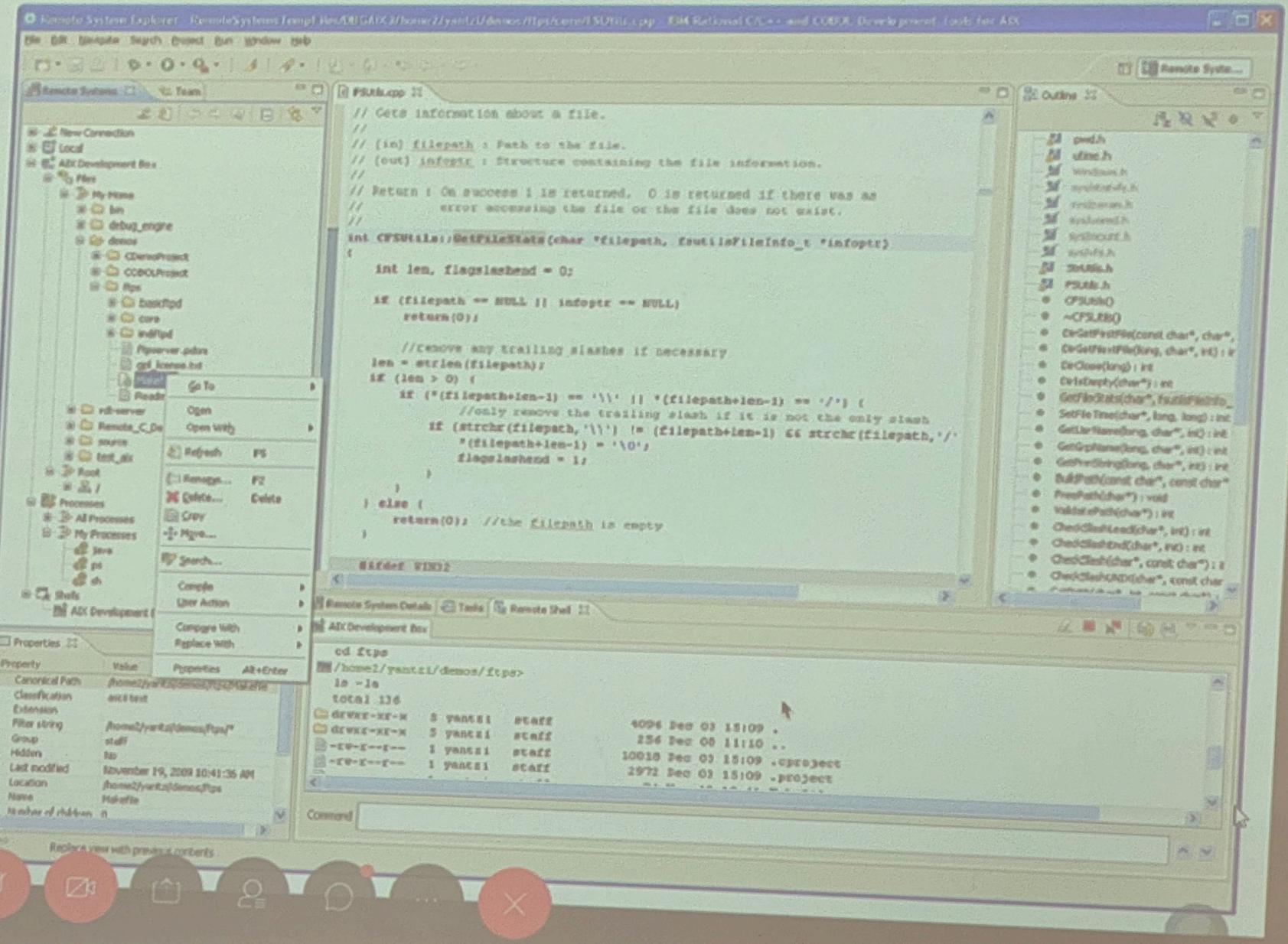


Rational Developer for i - 9.6.06

- 现代化开发工具
- 提高编码效率
- 整合编码环境
- 支持RPG, COBOL, CL, C, C++, SQL, DDM

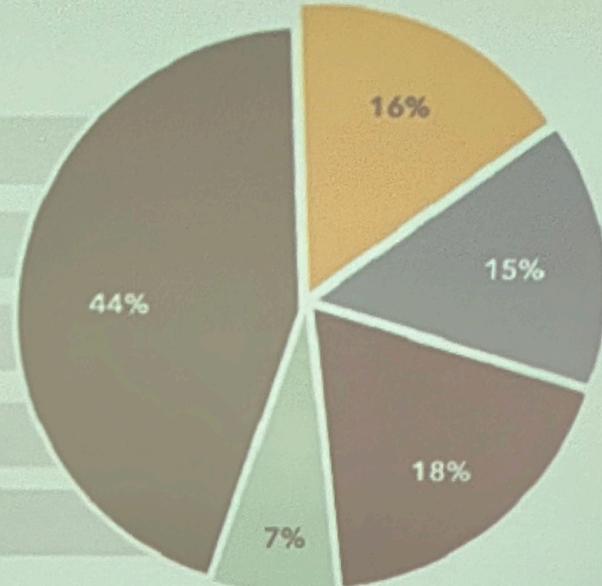
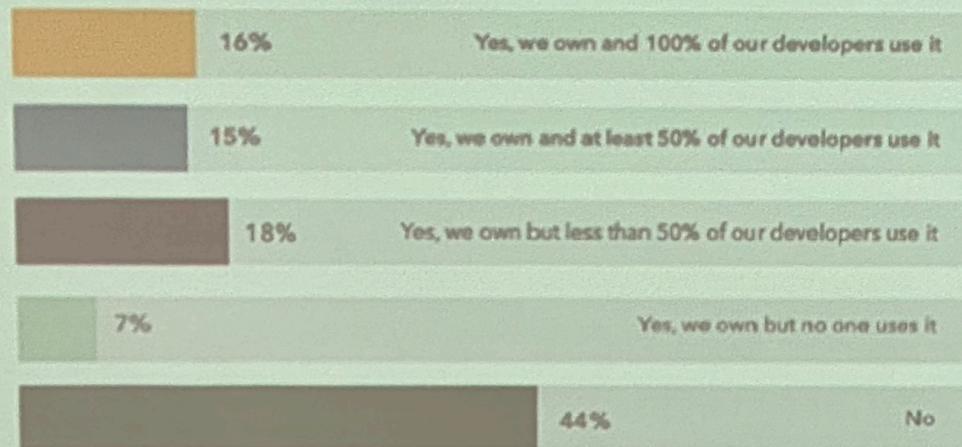
更新:

- PDM视图
- 代码重构支持更新
- 对SQL格式的更新
- 7.4 RPG & COBOL 新功能支持
- ILE 解析器发现代码异常
- 快捷键代码缩放
- 基于代码覆盖的更新



RDi 用户调查(HelpSystems)

Do you own/use Rational Developer for i (RDi)?



RECOMMENDATION:

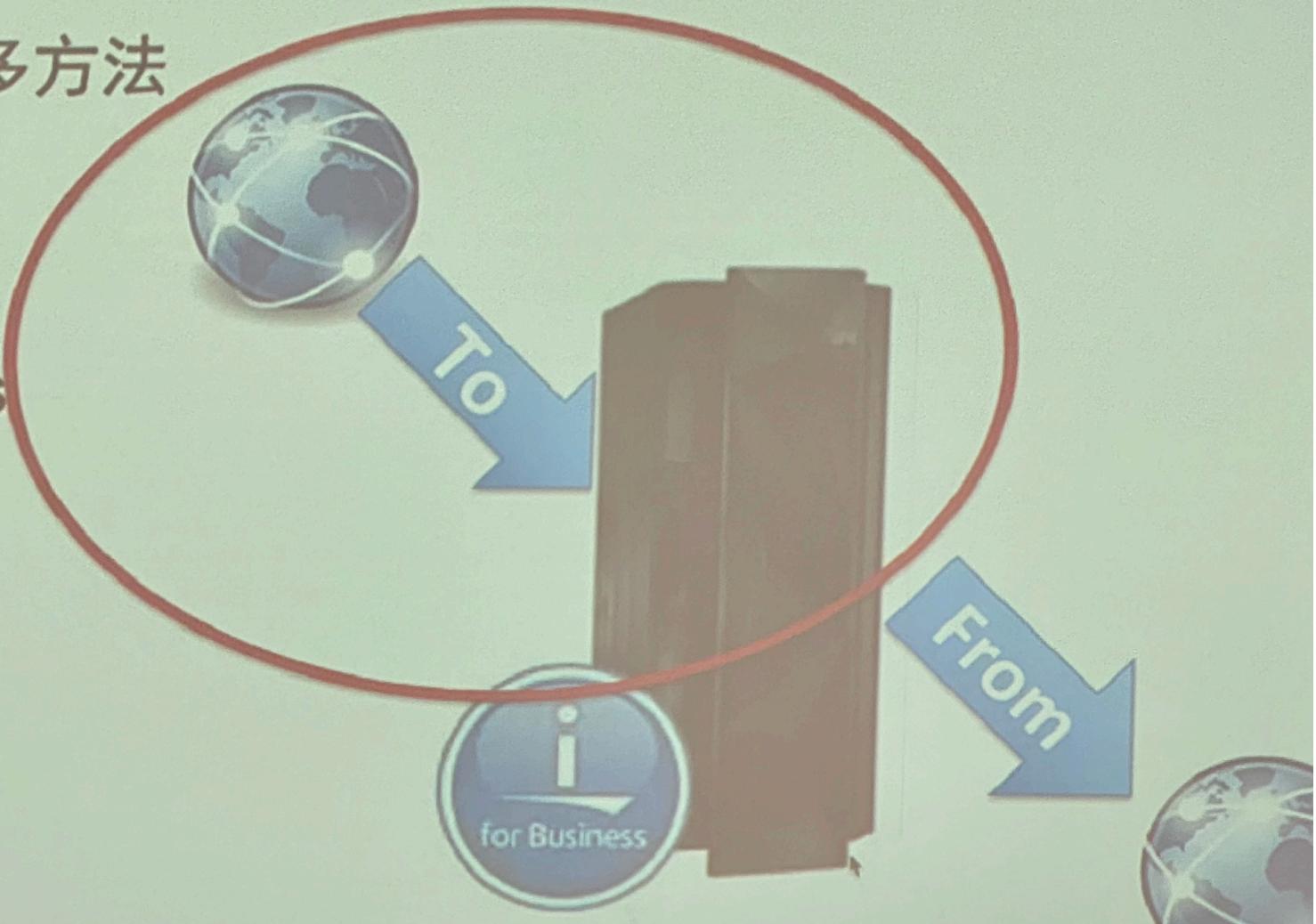
RDi enables IT teams to create, maintain, and modernize applications running on IBM i quickly and easily. Teams that leverage this valuable technology tend to see large gains in their productivity. HelpSystems recommends that all IBM i shops that aren't using RDi take a fresh look at it as a method of not only modernizing their infrastructure, but also of handling larger development backlogs.

<https://www.helpsystems.com/resources/guides/ibm-i-marketplace-survey-results>

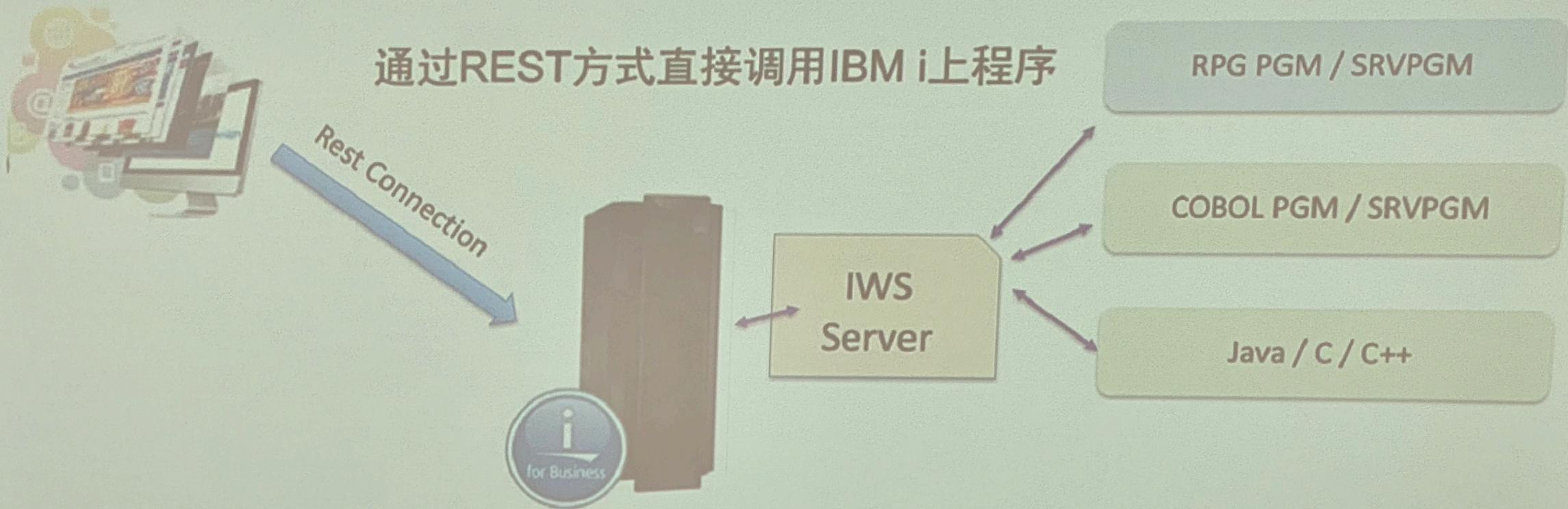
连接到 IBM i

连接到IBM i访问信息有很多方法

- ODBC
- JDBC
- Open Source Toolkits
- Java Toolbox
- SOAP Web Services
- REST APIs
- MQ
- Others...



Rest Apis

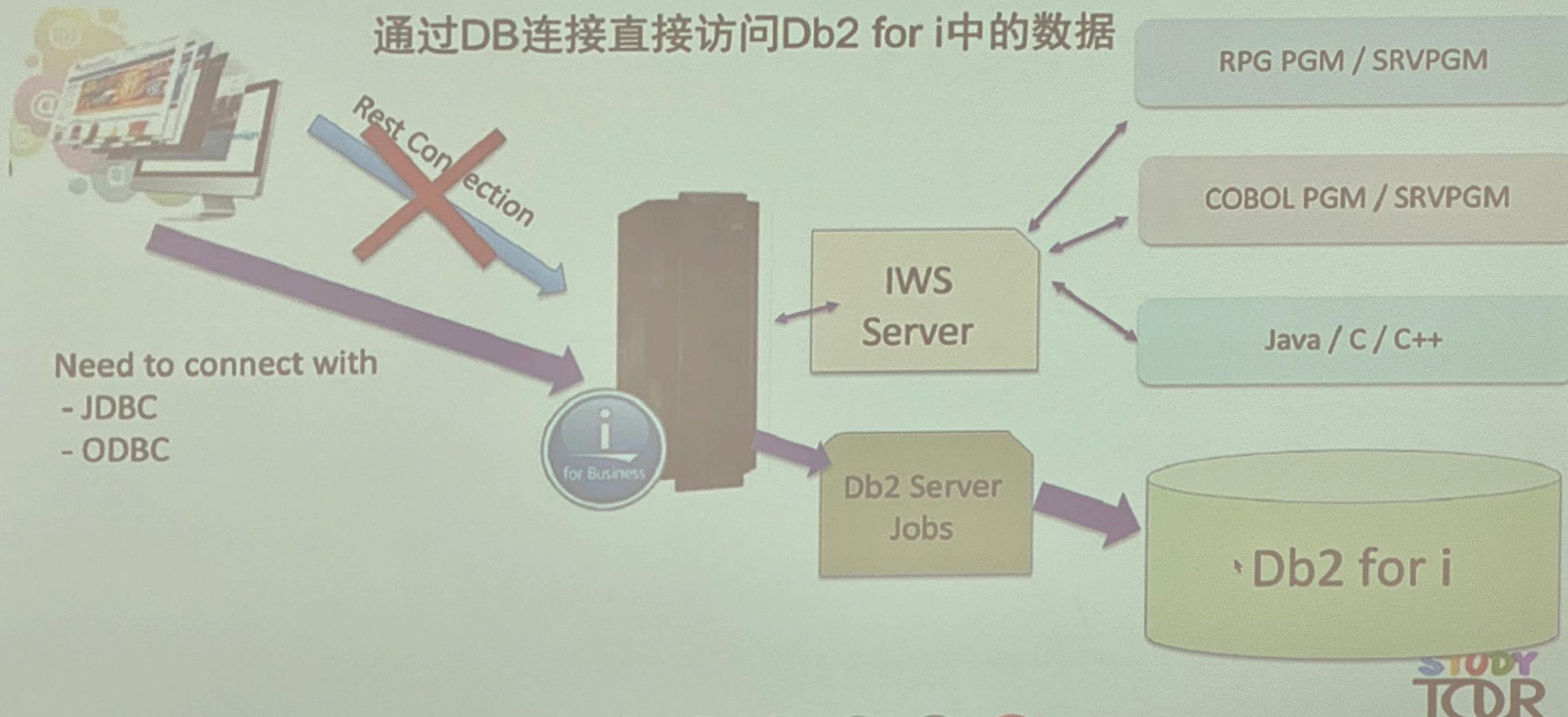


Video recording of REST Api for IBM i session

<https://www.youtube.com/watch?v=tMPUbsrRXnk>

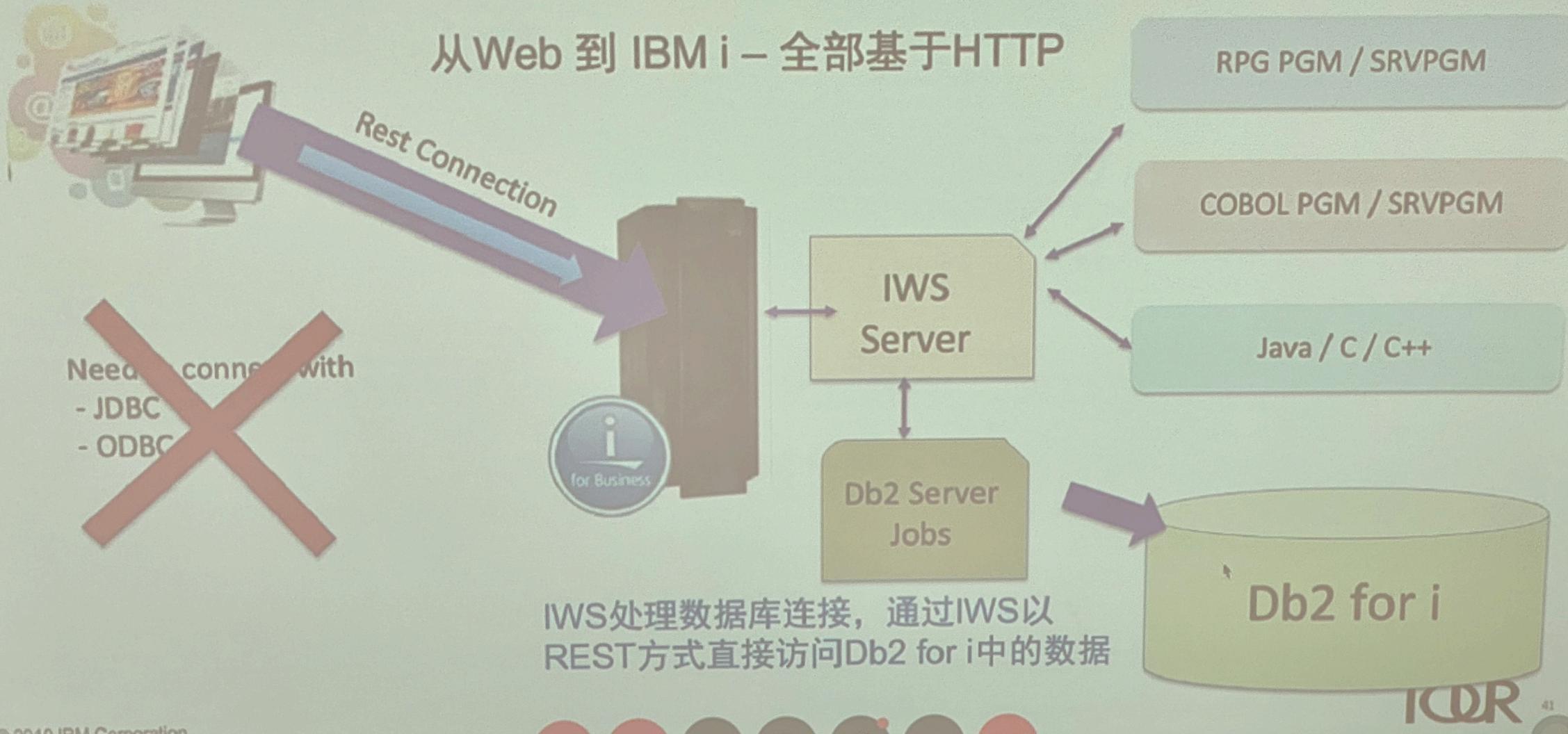


Rest Apis





7.4 - Rest Apis 最新更新



对Loopback的支持

- 在Node.js框架下，更容易的提供REST API服务

book

Show Hide List Operations Expand Operations

Patch an existing model instance or insert a new one into the data source.

Find all instances of the model matched by filter from the data source.

Table	Columns	Key Constraints	Foreign Key Constraints	Check Constraints	Materialized Query	Partitioning
Column Name	System Name	Data Type	Length	Nullable	Generated Value	Default Value
"isbn"	ISBN_00001	INTEGER		Yes		No default
"id"	ID_00001	INTEGER		No	Identity	
"personId"	PERSO00001	INTEGER		Yes		No default
"title"	TITLE00001	VARCHAR	128	Yes		No default

Check whether a model instance exists in the data source.

Fetches belongsTo relation person.

Replace attributes for a model instance and persist it into the data source.

Create a change stream.

Create a change stream.

Count instances of the model matched by where from the data source.

Find first instance of the model matched by filter from the data source.

Replace an existing model instance or insert a new one into the data source.

Update instances of the model matched by [where] from the data source.

Upsert instances of the model based on the where criteria.

Where

Sort

Filter

Group

Count

Order

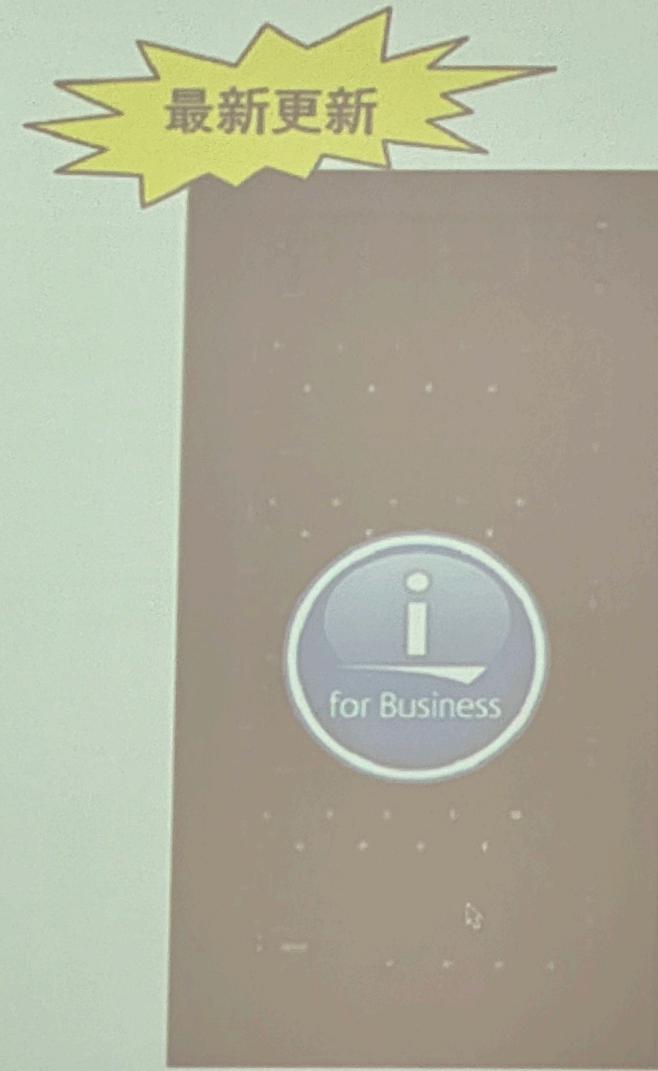
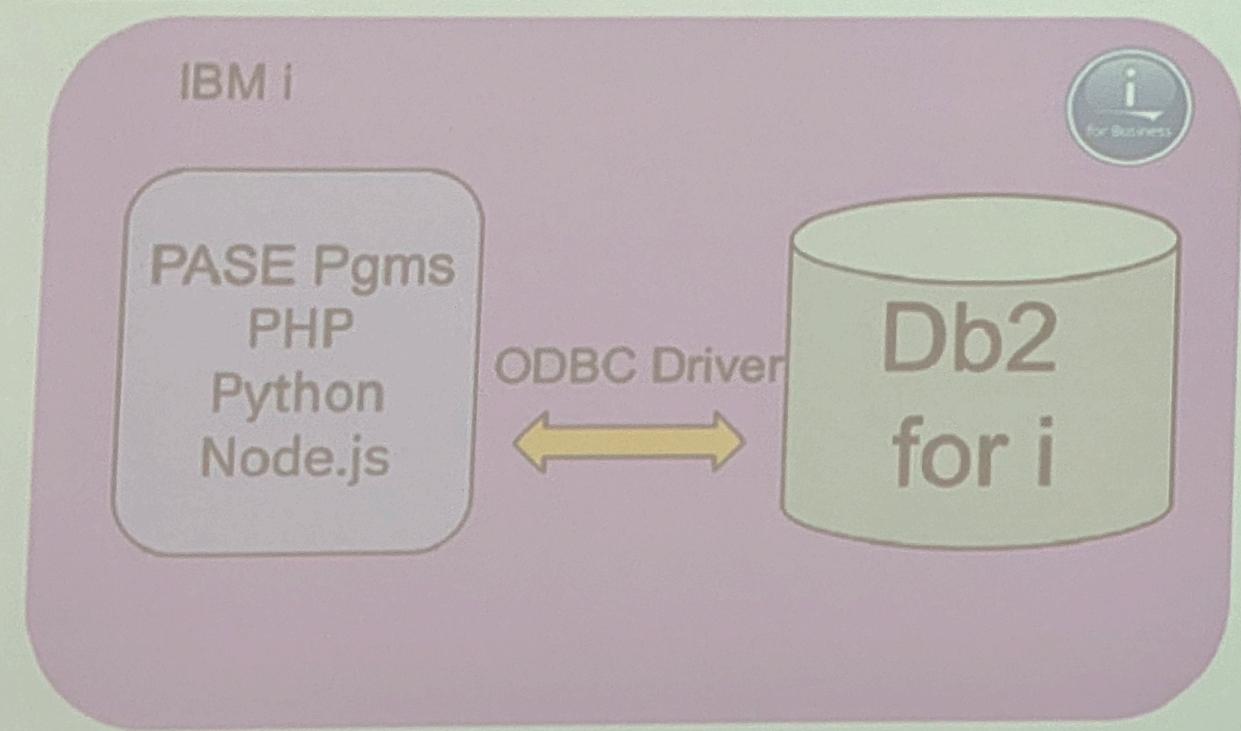
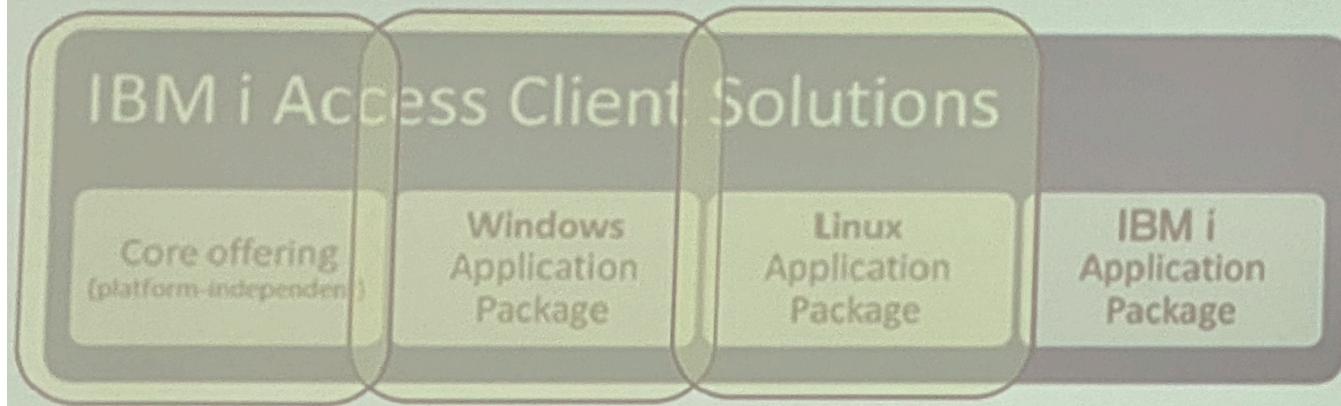
...

X

Microservices

RUDY DR

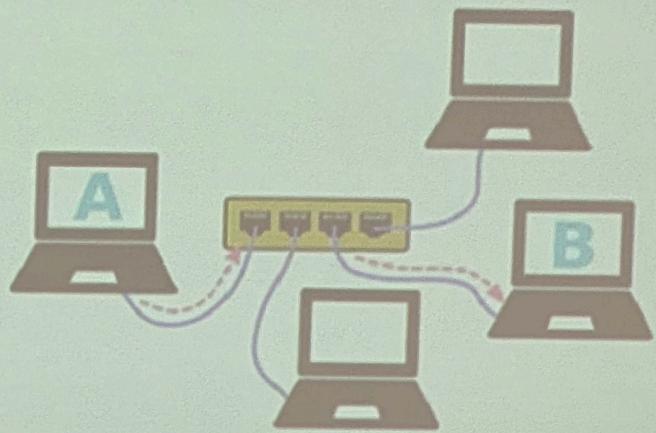
Access Client Solutions Family



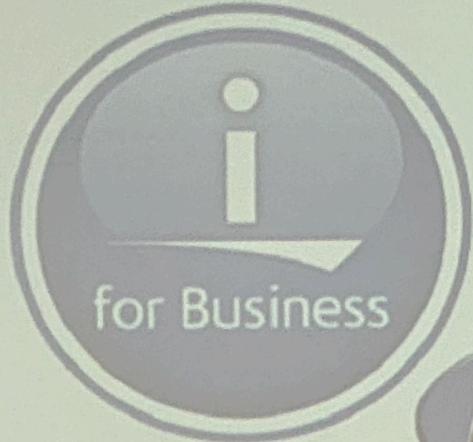


- JTOpen JDBC
 - 在7.4之前，如果对服务器的连接断掉，则需要与备份服务器重新建立连接
 - IBM i 7.4 – 应用对服务器的连接不会断掉，而是直接切换到注册好的备份服务器上
 - 用户也可以选择等待一段时间后尝试重新连接

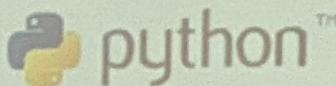
IBM i



IBM i 开源支持



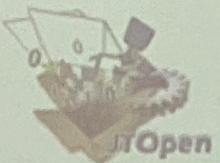
RPG



php



Liberty



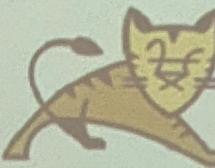
rsvnc



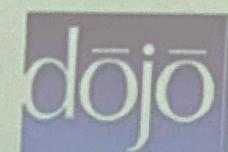
PostgreSQL



chroot



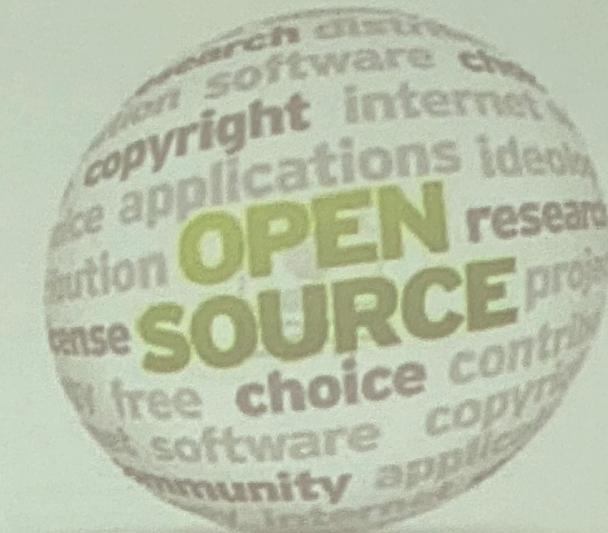
NGINX



Apache



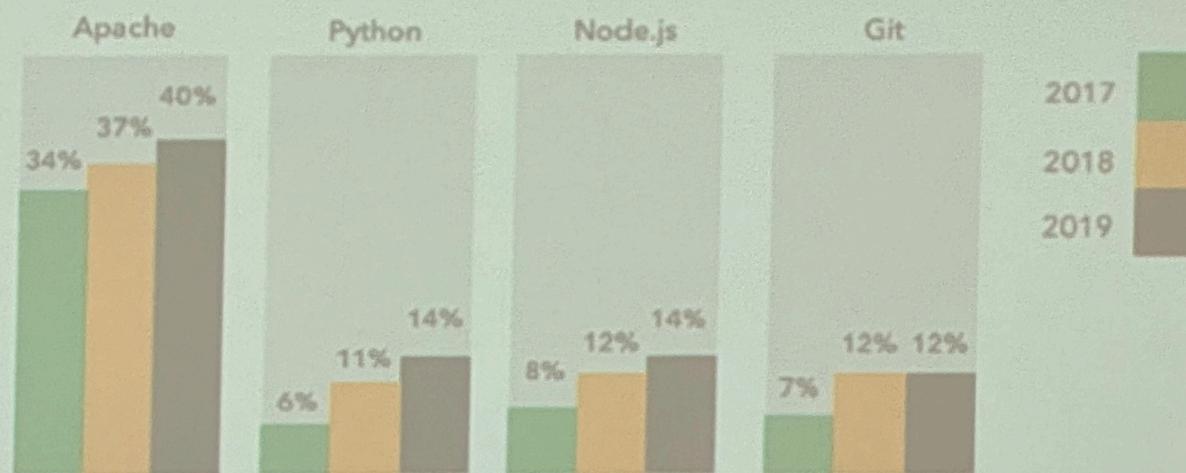
**STUDY
TOOL**



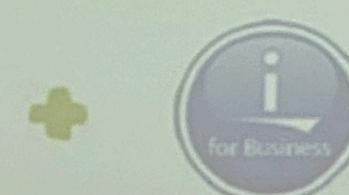
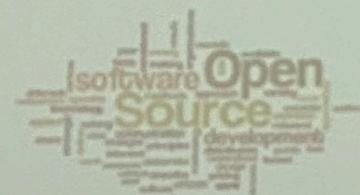
开源技术商业价值

- 选择多样，更多的支持
- 强大的生态
- 缩短业务实现时间，节约成本
- 行业标准
- 无需修改已有和核心业务，利用开源产品拓展，很方便的同Web Service，移动等技术集成
- 促进技术创新

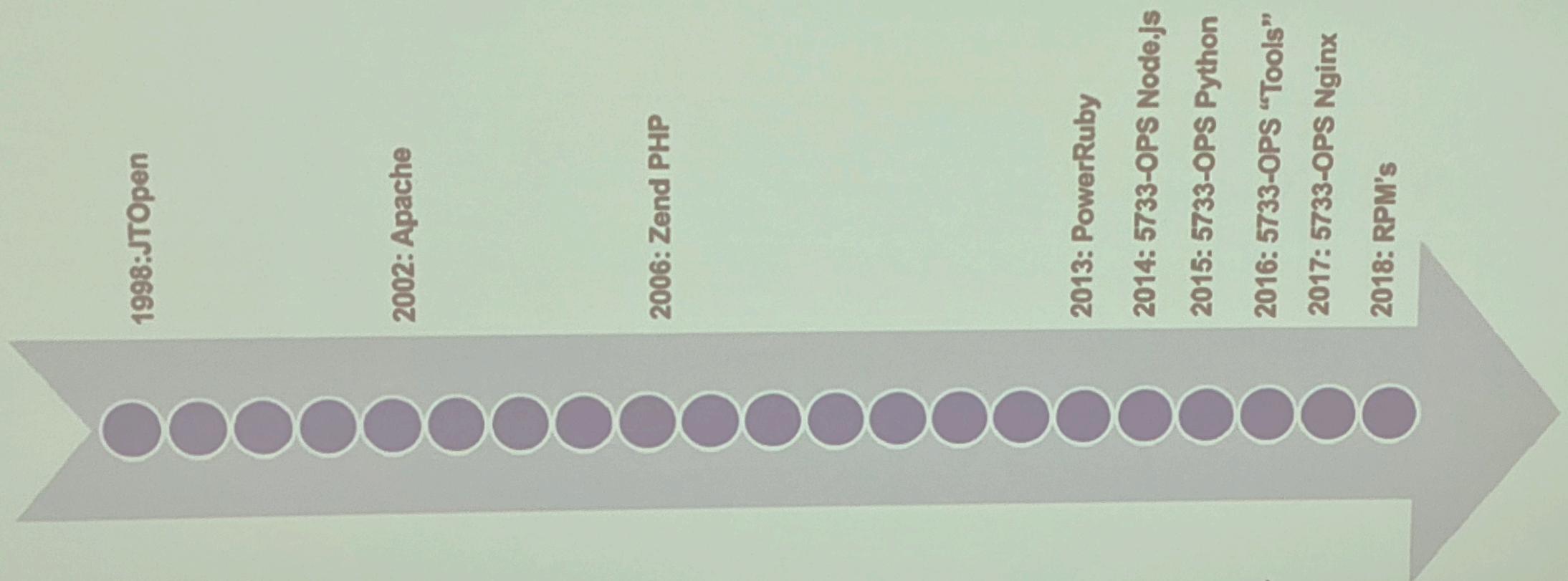
Which open source development tools are you using for IBM i apps?



<https://static.helpsystems.com/hs/pdfs/2019-marketplace/2019-ibmi-marketplace-survey.pdf>



IBM i上开源支持时间轴



开源软件RPMs

- 5733-OPS 不再被使用
- 开源软件以RPM的形式发布



- 更多信息请打开下面的链接:
 - <http://ibm.biz/ibmi-rpms>

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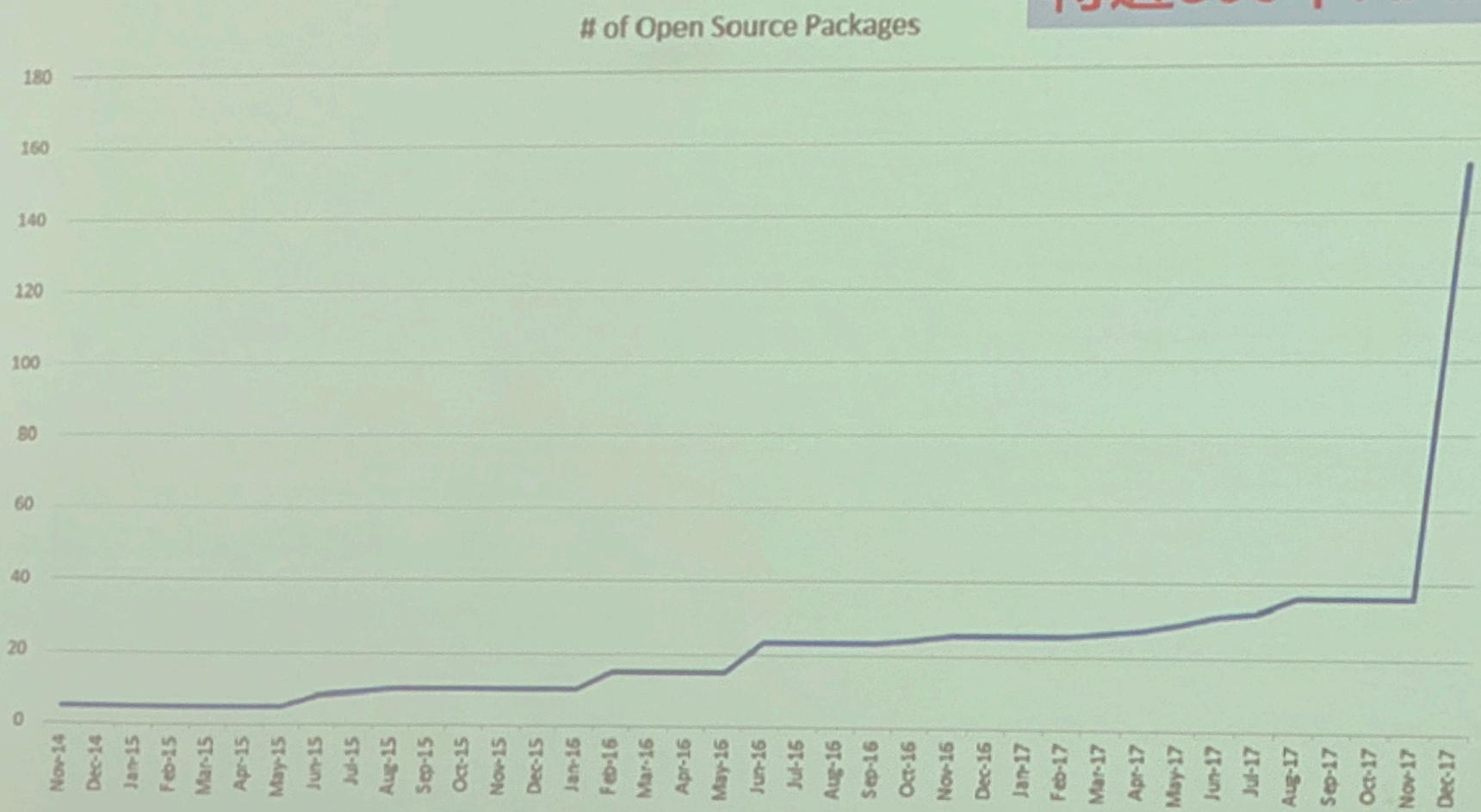


File	View	Connection	Utilities
Connection: timmr@common1.idevccloud.com:/			
			Installed packages Updates available Available packages
Package	Version	Repository	
activemq	5.11.1-0	@ibm	
bash	4.4-1	@ibm	
bzip2	1.0.6-13	@ibm/Sreleasever	
coreutils-gnu	8.25-2	@ibm/Sreleasever	
coreutils-pase-dummy	7.1-0	installed	
createrepo	0.10.4-3	@ibm/Sreleasever	
db	4.8.30-0	@ibm/Sreleasever	
db2util	1.0.9-0	@ibm	
file-magic	5.32-4	@ibm/Sreleasever	
findutils	4.6.0-1	@ibm/Sreleasever	
gawk	4.1.4-1	@ibm/Sreleasever	
gcc-aix	6.3.0-24	@ibm/Sreleasever	
gcc-cplusplus-aix	6.3.0-24	@ibm/Sreleasever	
gcc-cpp-aix	6.3.0-24	@ibm/Sreleasever	
gcc-glorvan-aix	6.3.0-24	@ibm/Sreleasever	
gmp-aix	5.1.3-12	@ibm/Sreleasever	
grep-gnu	3.0-0	@ibm	
gzip	1.8-1	@ibm/Sreleasever	
ibmcic	1.2.1-1	installed	
ibmichroot	2.1.3-0	@ibm/Sreleasever	
hookit-uts	1.0.0-0	@ibm/Sreleasever	
jon	4.6-2	@ibm/Sreleasever	
less	481-0	@ibm	
http	4.8.3-11	@ibm	
ibatomic1	6.3.0-24	@ibm/Sreleasever	
ibblas3	3.8.0-0	@ibm	
ibhax1_1	1.0.0-33	installed	

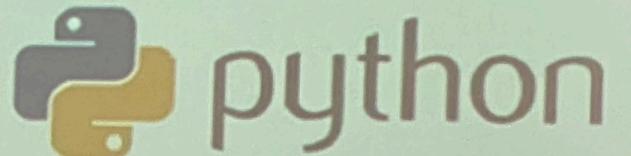
STUDY
TOOL



开源软件RPMs

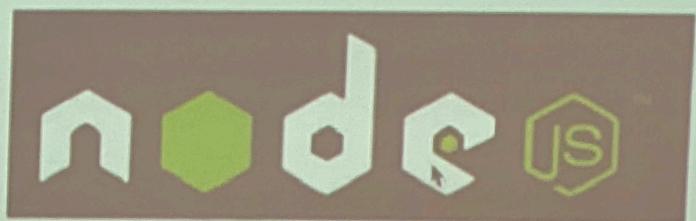


将近300个RPM包

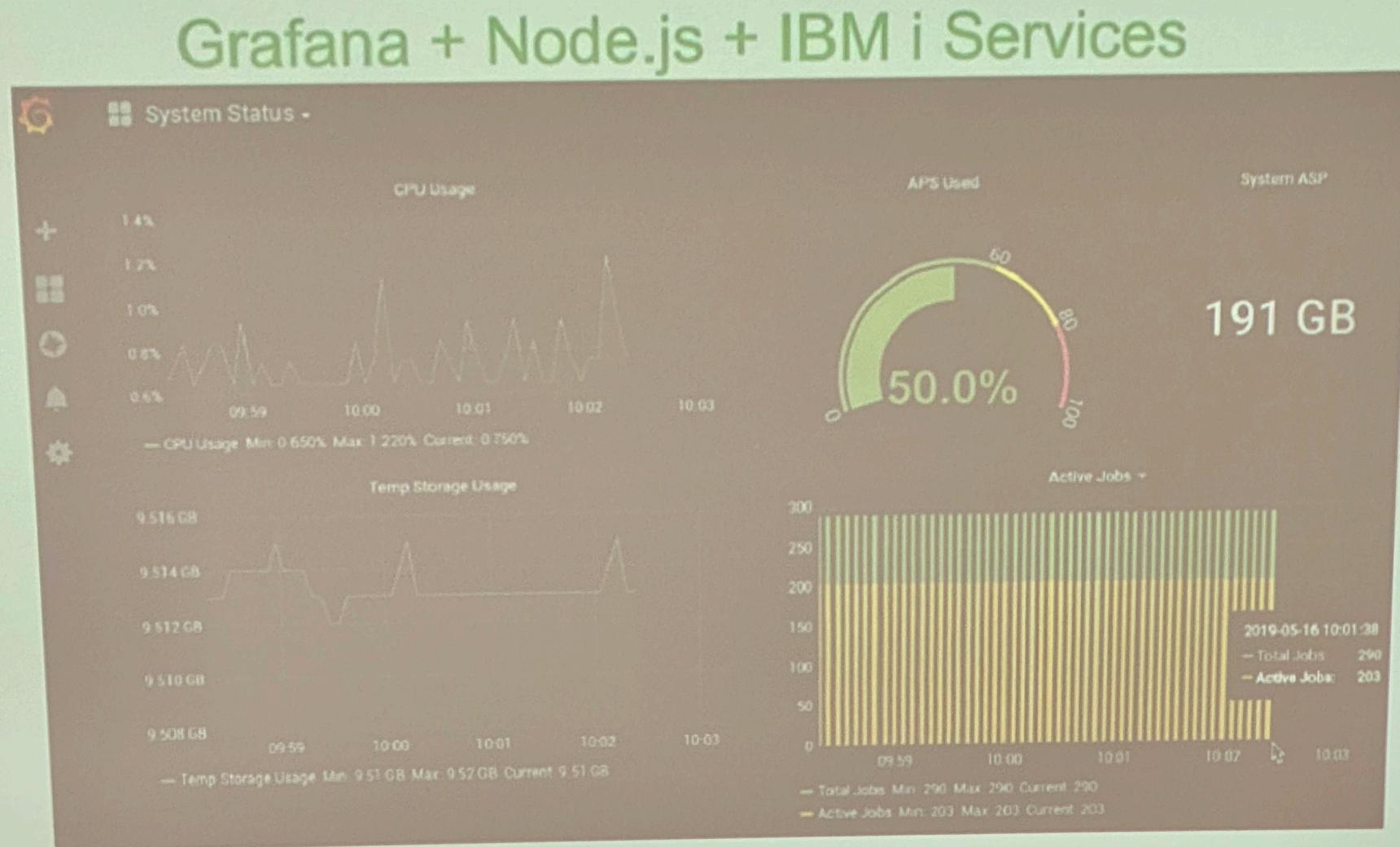


Node.js version 10

- Long-term-support (LTS) release
 - Performance improvements
 - New version of node package manager (NPM)
 - JavaScript language enhancements
- Buildable from community source
 - Anyone can use a tool like nvm to manage their own versions, including feature releases
- Expecting version 12 soon!



Grafana + Node.js – 系统监控

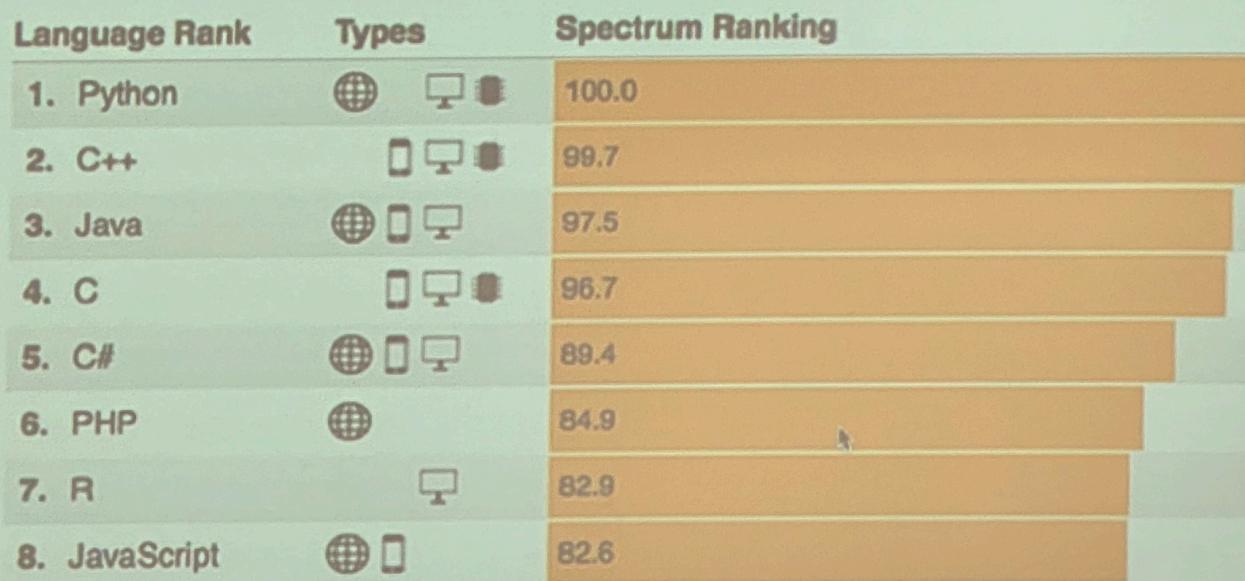




R: a new programming language on IBM i !

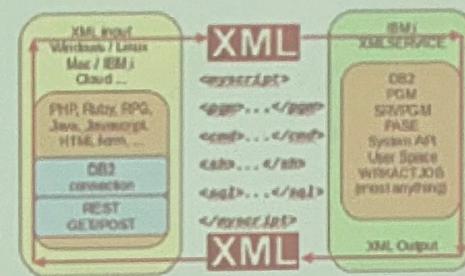
- Great for:
 - Data analysis
 - Statistical computing
 - Data mining
 - Big Data
- Ranked #7 by IEEE

<https://spectrum.ieee.org/technology/the-2018-top-programming-languages>

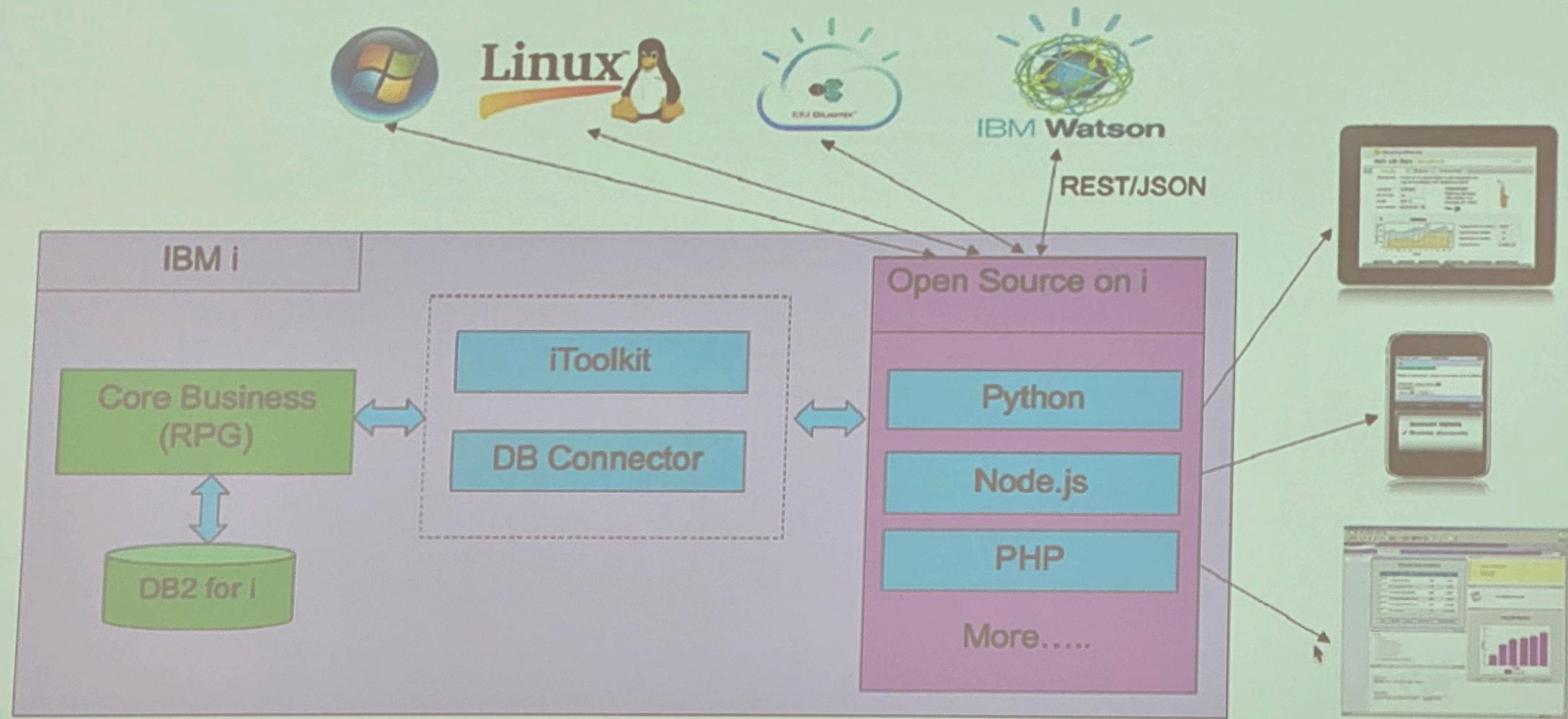


为每种开源语言提供如下扩展

- Database Connector
 - ✓ 使用SQL访问IBM i数据库中的数据
- ILE Object Toolkit
 - ✓ 访问IBM i本地对象（基于XML Service）
- FastCGI
 - ✓ 同HTTP服务器集成



用开源技术扩展你的IBM i业务



开源语言 IBM i toolkit

- **Node.JS Itoolkit**
 - <https://bitbucket.org/litmis/nodejs-itoolkit>
- **Python Itoolkit-lite**
 - <http://yips.idevcloud.com/wiki/index.php/XMLSERVICE/Python>
 - <https://bitbucket.org/litmis/python-itoolkit>
- **PHP Toolkit for IBM i**
 - http://files.zend.com/help/Zend-Server-IBMi/content/php_toolkit_xml_service_functions.htm
 - <http://www.seidengroup.com/toolkit/>
- **Ruby itoolkit**
 - <https://bitbucket.org/litmis/ruby-itoolkit>
- **Swift**
 - <https://bitbucket.org/litmis/swift-itoolkit>

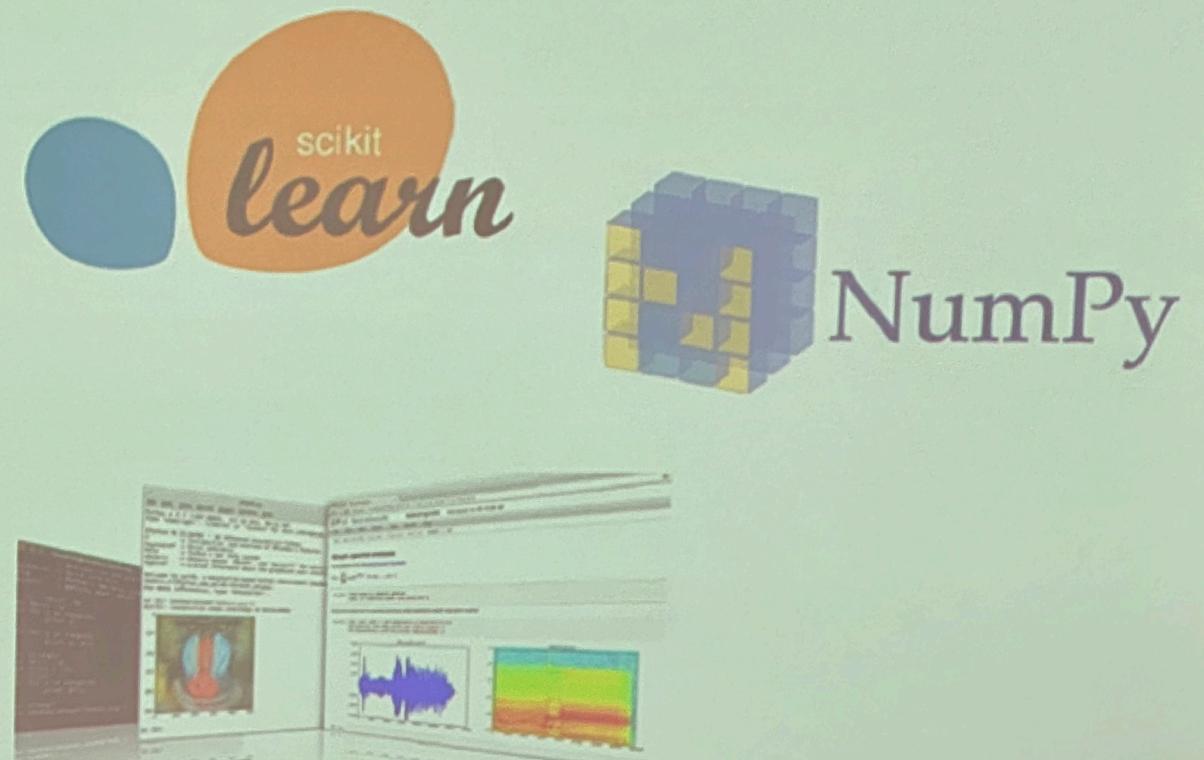
ActiveMQ

- 基于Java的开源消息中间件
- 支持的协议：
 - OpenWire
 - STOMP
 - MQTT
 - AMQP
 - REST
 - WebSockets



Python 机器学习和数据科学

- 在PASE下可以通过RPM，或者通过pip3进行安装
 - NumPy, Pandas
 - 数据处理
 - Scipy, Scikit-Learn
 - 机器学习和科学分析
 - ipython
 - 交互式python支持
 - nltk,
 - 机器学习自然语言工具包
 - matplotlib, jupyter notebook
 - 可视化/交互的机器学习/数据分析

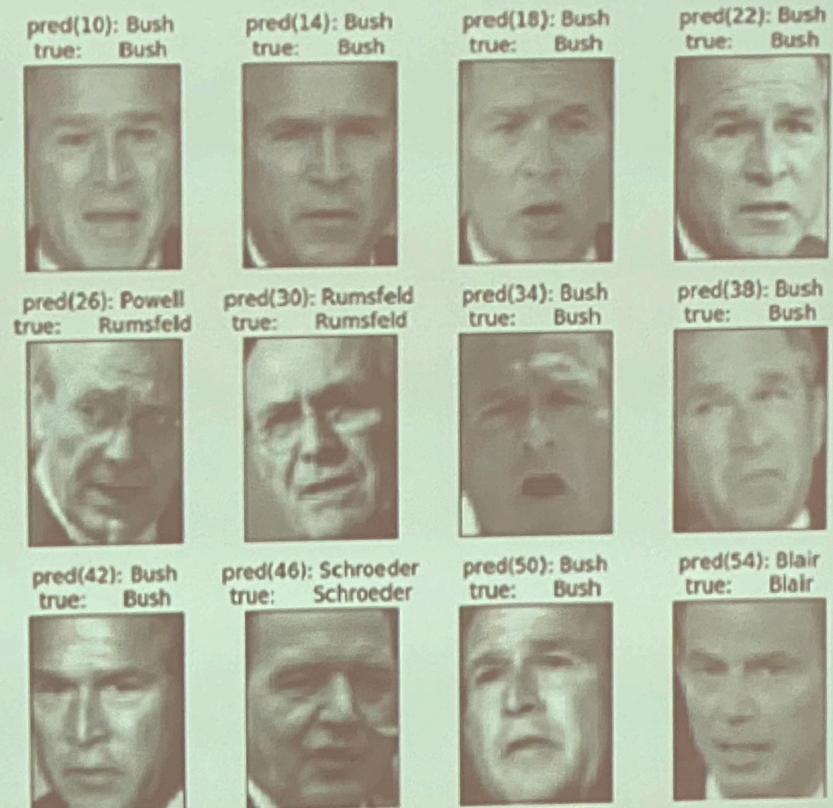




scikit-learn展示用例

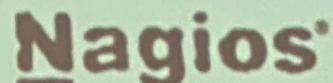
- 人脸识别
 - 图片数据来源于LFW(Labeled Faces in the Wild)
 - 使用PCA进行图片的特征缩减
 - 使用SVM来进行分类.
 - 使用GridSearchCV来寻找最佳的超参.

---classification_report---					
	precision	recall	f1-score	support	
Ariel Sharon	0.60	0.46	0.52	13	
Colin Powell	0.80	0.87	0.83	60	
Donald Rumsfeld	0.94	0.63	0.76	27	
George W Bush	0.83	0.98	0.90	146	
Gerhard Schroeder	0.95	0.80	0.87	25	
Hugo Chavez	1.00	0.47	0.64	15	
Tony Blair	1.00	0.78	0.88	36	
avg / total	0.86	0.85	0.84	322	



---confusion_matrix---						
[6	2	0	5	0	0
[2	52	0	6	0	0
[1	2	17	7	0	0
[0	3	0	143	0	0
[0	1	0	4	20	0
[0	4	0	3	1	7
[1	1	1	5	0	0

Nagios for IBM i



The Industry Standard In IT Infrastructure Monitoring

[Products](#)[Resources](#)[Solutions](#)[Partners](#)[About](#)[Downloads](#)

IBM i Monitoring With Nagios

Capabilities

Nagios provides comprehensive monitoring of your IBM i servers, including metrics like CPU and disk utilization, ASP usage, number of active jobs, and long-running SQL jobs, plus much more. These services are supported via SNMP, JTOpen, and the official IBM i Nagios plugin powered by SQL.

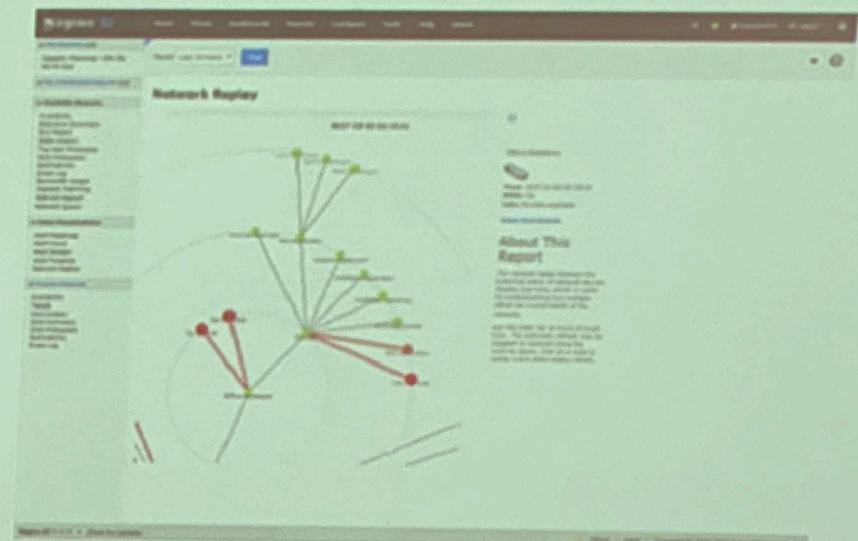
Nagios + IBM i provides administrators and operators with a centralized view of all IT assets in addition to the core IBM i metrics.

You will also be able to graph and report on historical performance and have the flexibility to configure thresholds to your liking, not to mention the capability to create your own custom plug-ins.

Nagios is a powerful network monitoring tool that allows you the freedom you need to be able to manage everything on your network.



Recommended Software: Nagios XI

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Thank you !

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