1 软件环境

- VirtualBox 5.2
- Oracle Linux 6.7
- Oracle 12.1.0.2

2 概述

2.1官方文档

【官方文档】

https://docs.oracle.com/database/121/ADMIN/cdb_create.htm#ADMIN14210

Part VI Managing a Multitenant Environment

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▼ 37 Creating and Configuring a CDB

37.1 About Creating a CDB

37.2 Planning for CDB Creation

37.2.1 Decide How to Configure the CDB

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37.3 Using DBCA to Create a CDB

37.4 Using the CREATE DATABASE Statement to Create a CDB

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37.4.2 Creating a CDB with the CREATE DATABASE Statement

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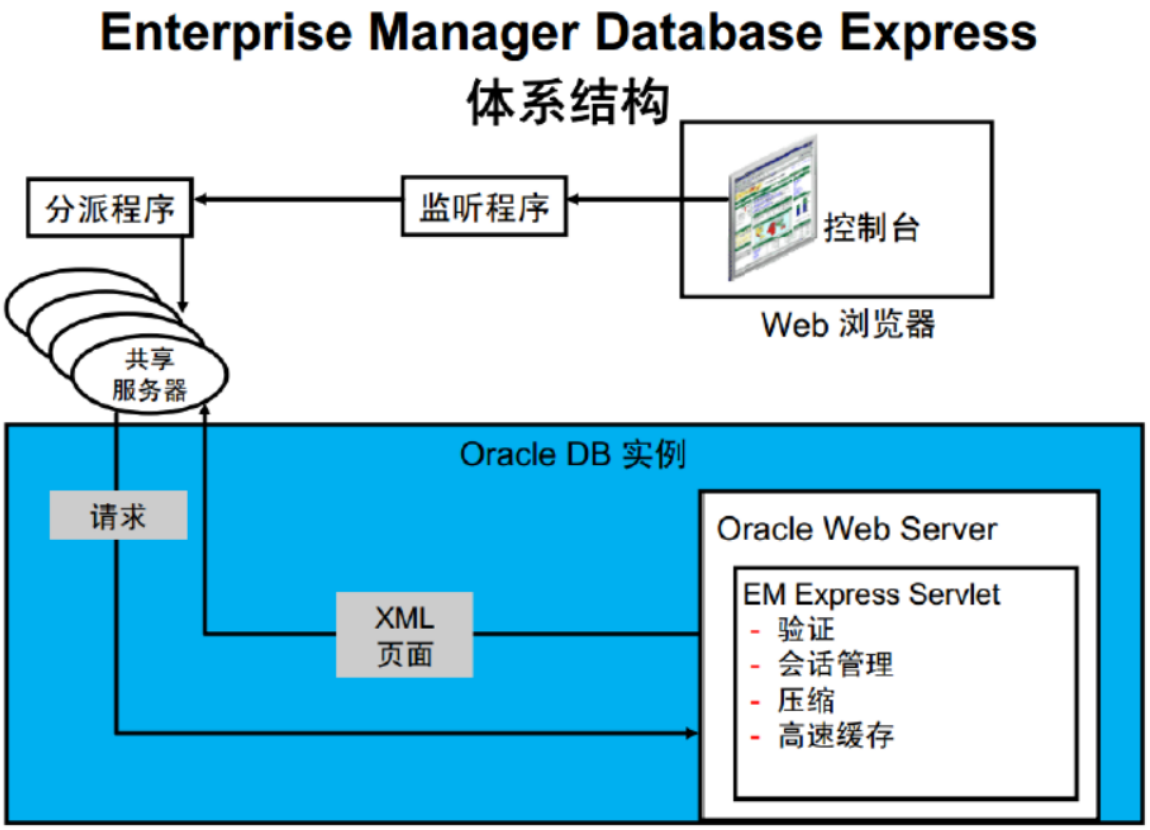
2.2 EM Express 12c体系结构



2.3 EM Express 12c配置方法

配置HTTP或HTTPS监听监听程序端口：

- 验证dispatchers参数

```
dispatchers="(PROTOCOL=TCP)(SERVICE=<sid>XDB)"
```

- 配置EM Express端口

```
exec DBMS_XDB_CONFIG.SETHTTPSPORT(5500);
```

- URL访问EM Express

```
https://database-hostname:portnumber/em/
```

3 non-CDB 配置EM Express

3.1 查看监听器状态

[oracle@strong ~]$ lsnrctl status

```
[oracle@strong ~]$ lsnrctl status

LSNRCTL for Linux: Version 12.1.0.2.0 - Production on 05-JUN-2019 21:53:54

Copyright (c) 1991, 2014, Oracle.  All rights reserved.

Connecting to (ADDRESS=(PROTOCOL=tcp)(HOST=)(PORT=1521))
STATUS of the LISTENER
------------------------
Alias                     LISTENER
Version                   TNSLSNR for Linux: Version 12.1.0.2.0 - Production
Start Date                05-JUN-2019 21:04:18
Uptime                    0 days 0 hr. 49 min. 35 sec
Trace Level               off
Security                  ON: Local OS Authentication
SNMP                      OFF
Listener Log File         /u01/app/oracle/diag/tnslsnr/strong/listener/alert/log.xml
Listening Endpoints Summary...
  (DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=strong.oracle.com)(PORT=1521)))
  (DESCRIPTION=(ADDRESS=(PROTOCOL=tcps)(HOST=strong.oracle.com)(PORT=5500))(Security=(my_wallet_directory=/u01/app/oracle/admin/orcl/xdb_wallet))(Presentation=HTTP)(Session=RAW))
Services Summary...
Service "orcl" has 1 instance(s).
  Instance "orcl", status READY, has 1 handler(s) for this service...
Service "orclXDB" has 1 instance(s).
  Instance "orcl", status READY, has 1 handler(s) for this service...
The command completed successfully
```

EM Express默认端口是5500，说明EM Express已配置。

3.2 查看数据库配置

SQL> SELECT NAME, CDB, CON_ID FROM V$DATABASE;

```
SQL> SELECT NAME, CDB, CON_ID FROM V$DATABASE;

NAME      CDB     CON_ID
--------- --- ----------
ORCL      NO           0
```

3.3 查看EM Express配置

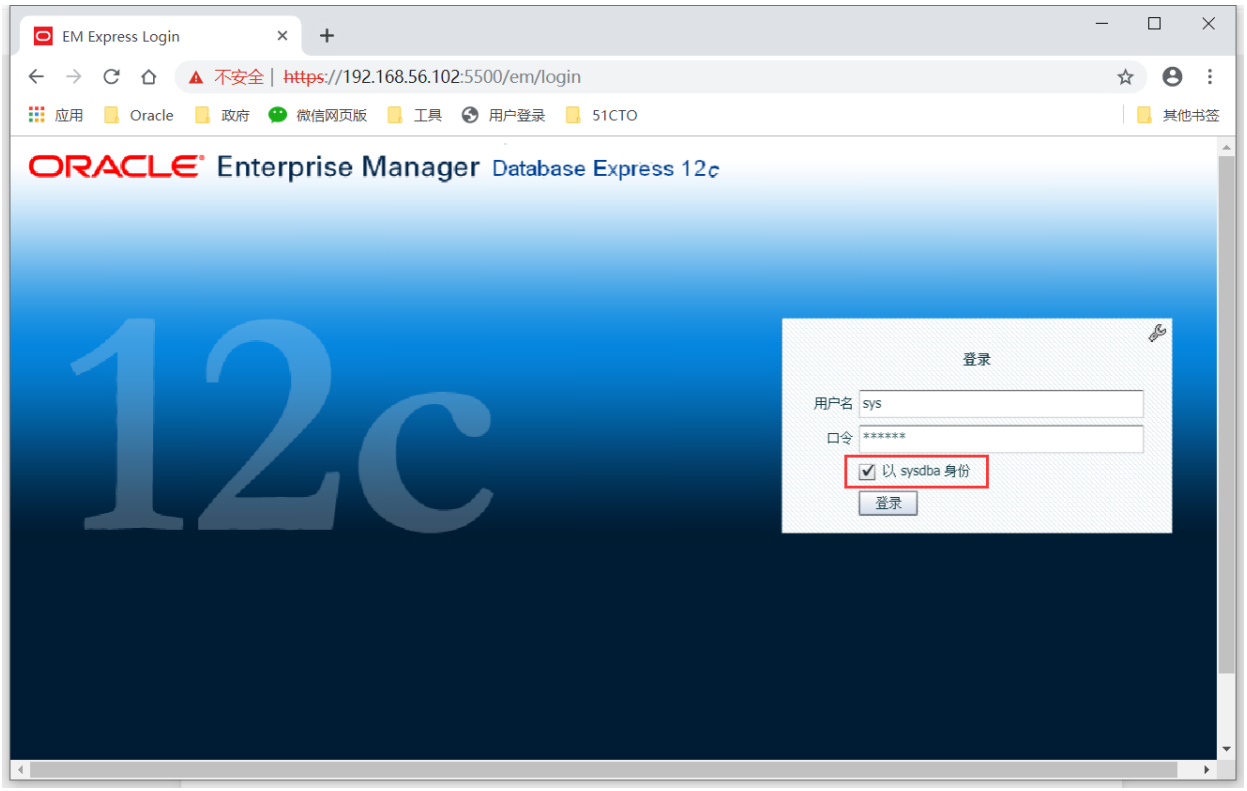
SQL> SELECT DBMS_XDB_CONFIG.GETHTTPPORT() FROM DUAL;

SQL> SELECT DBMS_XDB_CONFIG.GETHTTPSPORT FROM DUAL;

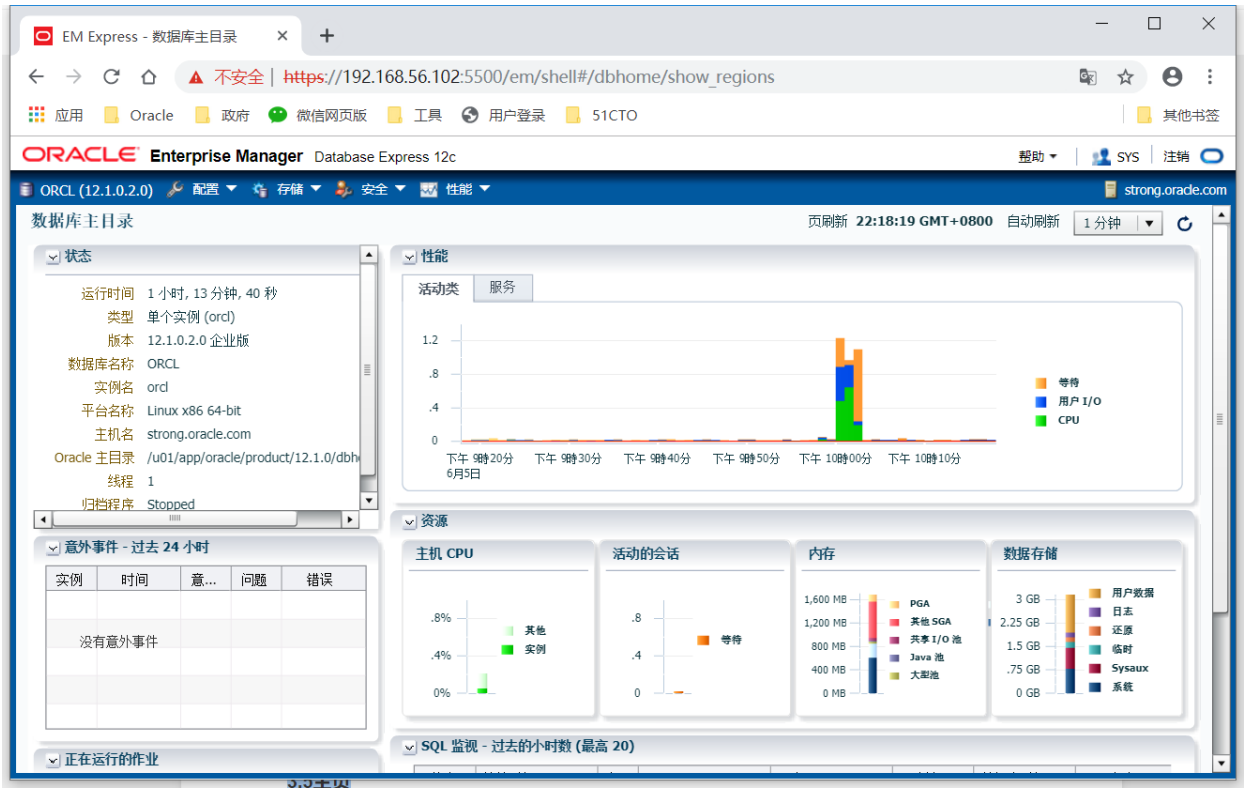
```
SQL> SELECT DBMS_XDB_CONFIG.GETHTTPPORT() FROM DUAL;

DBMS_XDB_CONFIG.GETHTTPPORT()
-----------------------------
                            0

SQL> SELECT DBMS_XDB_CONFIG.GETHTTPSPORT FROM DUAL;

GETHTTPSPORT
------------
        5500
```

3.4 访问EM Express

https://192.168.56.102:5500/em/

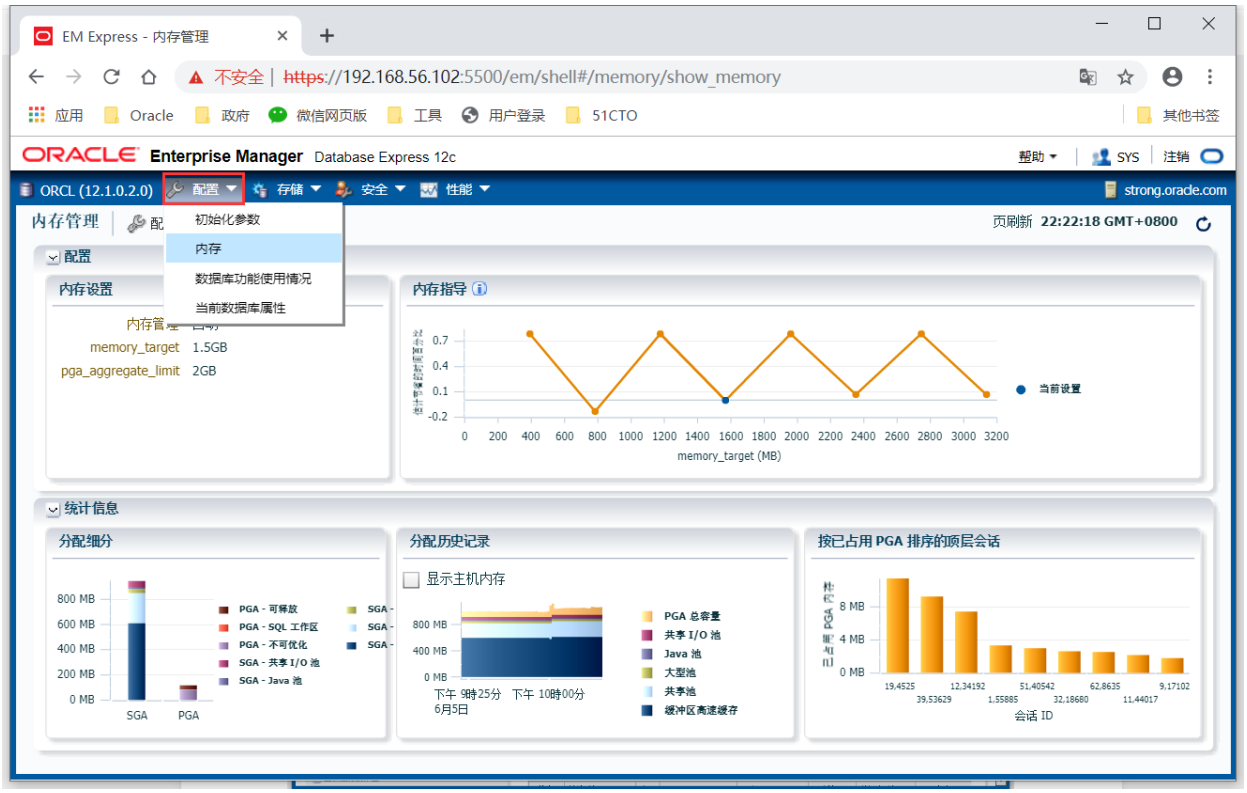

EM Express Login
不安全 | https://192.168.56.102:5500/em/login
应用 Oracle 政府 微信网页版 工具 用户登录 51CTO 其他书签
ORACLE Enterprise Manager Database Express 12c
12c
登录
用户名 sys
口令 ******
以 sysdba 身份
登录

3.5主页

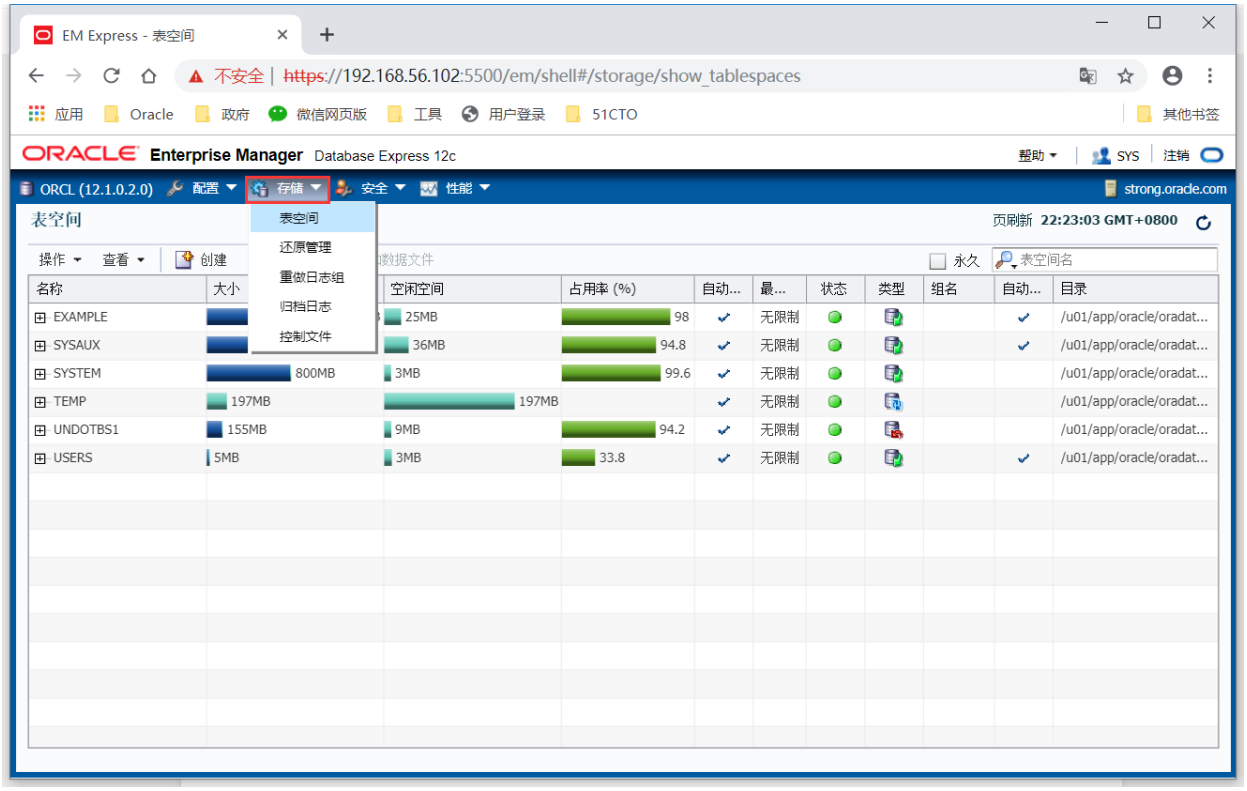

EM Express - 数据库主目录
不安全 | https://192.168.56.102:5500/em/shell#/dbhome/show_regions
应用 Oracle 政府 微信网页版 工具 用户登录 51CTO 其他书签
ORACLE Enterprise Manager Database Express 12c
帮助 SYS 注销
ORCL (12.1.0.2.0) 配置 存储 安全 性能 strong.oracle.com
数据库主目录
页刷新 22:18:19 GMT+0800 自动刷新 1 分钟
状态
运行时间 1 小时, 13 分钟, 40 秒
类型 单个实例 (orcl)
版本 12.1.0.2.0 企业版
数据库名称 ORCL
实例名 orcl
平台名称 Linux x86 64-bit
主机名 strong.oracle.com
Oracle 主目录 /u01/app/oracle/product/12.1.0/dbh
线程 1
归档程序 Stopped
性能
活动类 服务
等待
用户 I/O
CPU
资源
主机 CPU
活动的会话
内存
数据存储
意外事件 - 过去 24 小时
实例 时间 意... 问题 错误
没有意外事件
正在运行的作业
SQL 监视 - 过去的小时数 (最高 20)

3.6 菜单

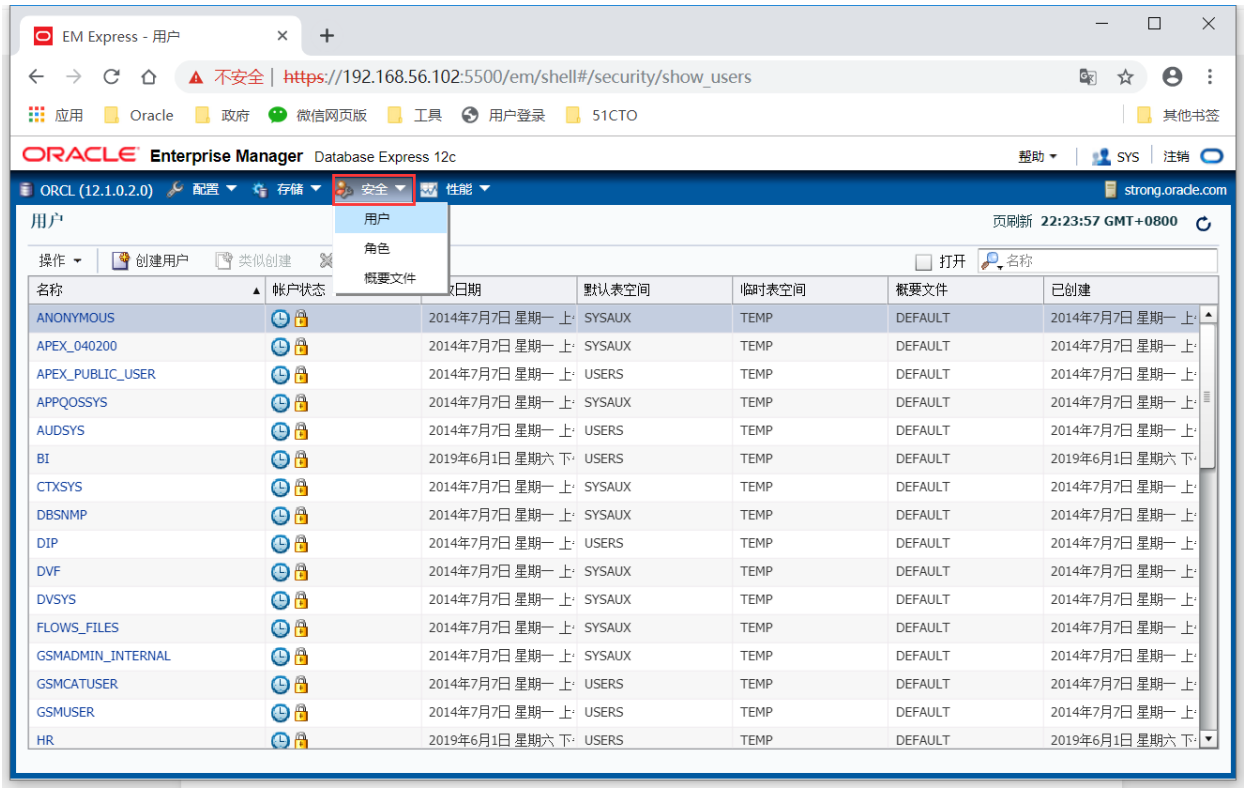
3.6.1 配置



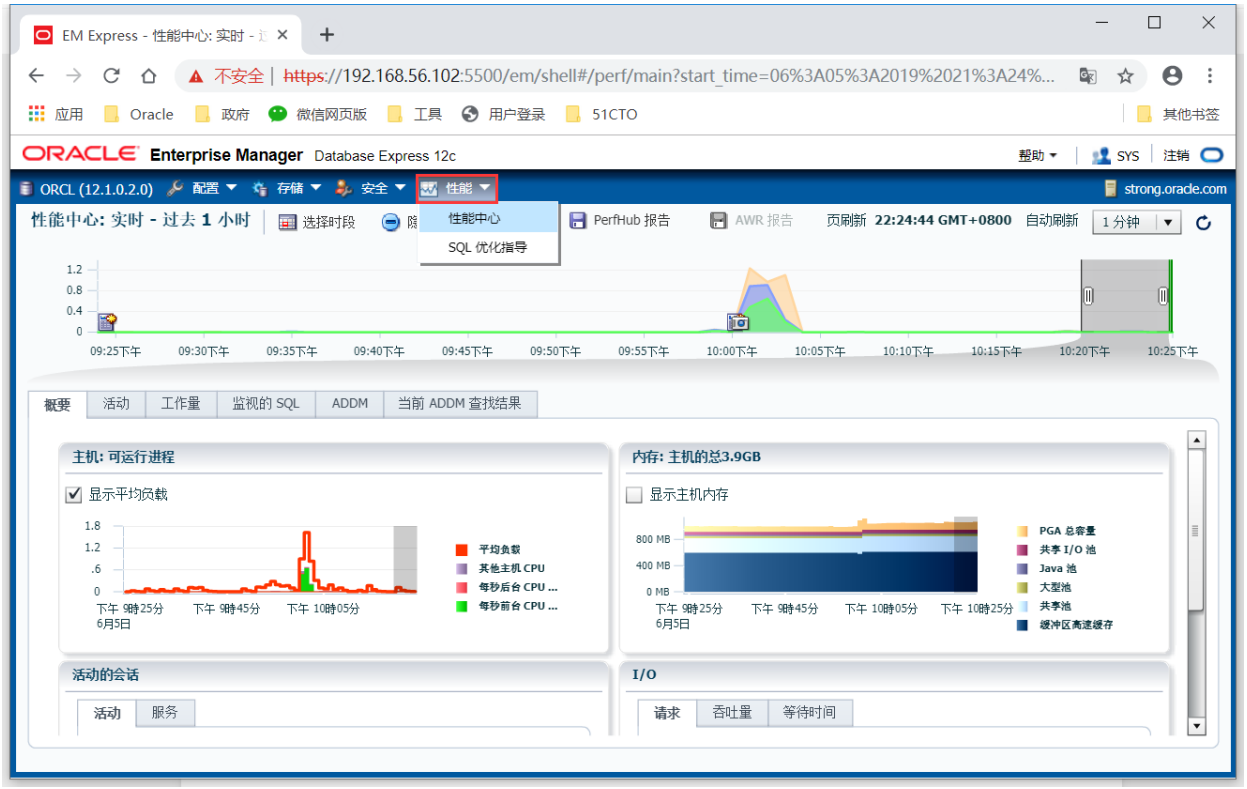
3.6.2 存储



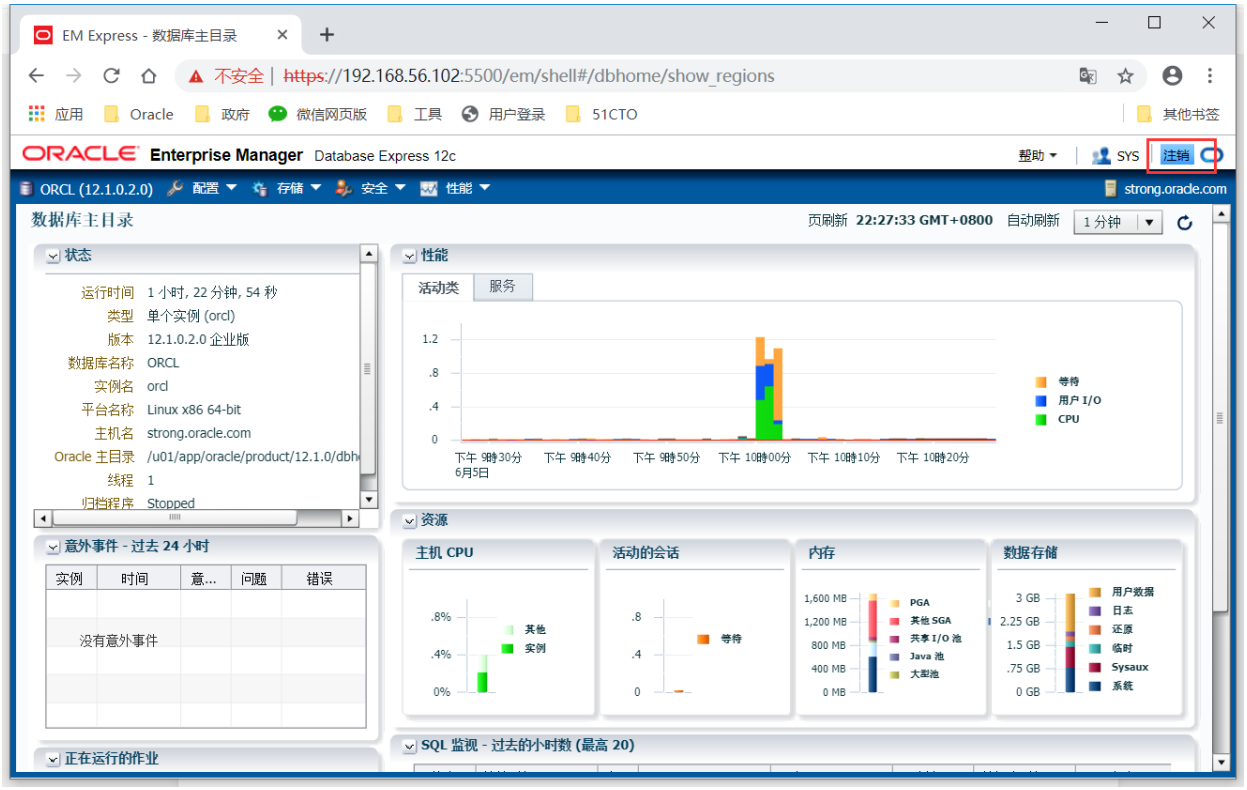
3.6.3 安全


EM Express - 用户
不安全 | https://192.168.56.102:5500/em/shell#/security/show_users
应用 Oracle 政府 微信网页版 工具 用户登录 51CTO 其他书签
ORACLE Enterprise Manager Database Express 12c
帮助 SYS 注销
ORCL (12.1.0.2.0) 配置 存储 安全 性能 strong.oracle.com
用户
角色
概要文件
用户
页刷新 22:23:57 GMT+0800
操作 创建用户 类似创建 打开 名称
名称 帐户状态 默认表空间 临时表空间 概要文件 已创建
ANONYMOUS SYSAUX TEMP DEFAULT
APEX_040200 SYSAUX TEMP DEFAULT
APEX_PUBLIC_USER USERS TEMP DEFAULT
APPQOSSYS SYSAUX TEMP DEFAULT
AUDSYS USERS TEMP DEFAULT
BI USERS TEMP DEFAULT
CTXSYS SYSAUX TEMP DEFAULT
DBSNMP SYSAUX TEMP DEFAULT
DIP USERS TEMP DEFAULT
DVF SYSAUX TEMP DEFAULT
DVSYS SYSAUX TEMP DEFAULT
FLOWS_FILES SYSAUX TEMP DEFAULT
GSMADMIN_INTERNAL SYSAUX TEMP DEFAULT
GSMCATUSER USERS TEMP DEFAULT
GSMUSER USERS TEMP DEFAULT
HR USERS TEMP DEFAULT

3.6.4 性能


EM Express - 性能中心: 实时
不安全 | https://192.168.56.102:5500/em/shell#/perf/main?start_time=06%3A05%3A2019%2021%3A24%...
应用 Oracle 政府 微信网页版 工具 用户登录 51CTO 其他书签
ORACLE Enterprise Manager Database Express 12c
帮助 SYS 注销
ORCL (12.1.0.2.0) 配置 存储 安全 性能 strong.oracle.com
性能中心
SQL 优化指导
性能中心: 实时 - 过去 1 小时 选择时段 PerfHub 报告 AWR 报告 页刷新 22:24:44 GMT+0800 自动刷新 1 分钟
概要 活动 工作量 监视的 SQL ADDM 当前 ADDM 查找结果
主机: 可运行进程
显示平均负载
内存: 主机的总3.9GB
显示主机内存
活动的会话
活动 服务
I/O
请求 吞吐量 等待时间

3.7 退出



4 CDB 配置EM Express

目标：配置容器数据库CDB1使用EM Express，使用HTTP协议，端口为5500。

4.1 启动监听

[oracle@strong ~]$ lsnrctl start

```
[oracle@strong ~]$ lsnrctl start

LSNRCTL for Linux: Version 12.1.0.2.0 - Production on 05-JUN-2019 22:55:53

Copyright (c) 1991, 2014, Oracle.  All rights reserved.

Starting /u01/app/oracle/product/12.1.0/dbhome_1/bin/tnslsnr: please wait...

TNSLSNR for Linux: Version 12.1.0.2.0 - Production
Log messages written to /u01/app/oracle/diag/tnslsnr/strong/listener/alert/log.xml
Listening on: (DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=strong.oracle.com)(PORT=1521)))

Connecting to (ADDRESS=(PROTOCOL=tcp)(HOST=)(PORT=1521))
STATUS of the LISTENER
------------------------
Alias                     LISTENER
Version                   TNSLSNR for Linux: Version 12.1.0.2.0 - Production
Start Date                05-JUN-2019 22:55:54
Uptime                    0 days 0 hr. 0 min. 0 sec
Trace Level               off
Security                  ON: Local OS Authentication
SNMP                      OFF
Listener Log File         /u01/app/oracle/diag/tnslsnr/strong/listener/alert/log.xml
Listening Endpoints Summary...
  (DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=strong.oracle.com)(PORT=1521)))
The listener supports no services
The command completed successfully
```

4.2 启动容器数据库CDB1

[oracle@strong ~]$ export ORACLE_SID=cdb1

[oracle@strong ~]$ echo $ORACLE_SID

```
[oracle@strong ~]$ export ORACLE_SID=cdb1
[oracle@strong ~]$ echo $ORACLE_SID
cdb1
```

[oracle@strong ~]$ sqlplus / as sysdba

```
[oracle@strong ~]$ sqlplus / as sysdba

SQL*Plus: Release 12.1.0.2.0 Production on Wed Jun 5 23:04:09 2019

Copyright (c) 1982, 2014, Oracle.  All rights reserved.

Connected to an idle instance.

SQL> startup
ORACLE instance started.

Total System Global Area 1644167168 bytes
Fixed Size                  2925024 bytes
Variable Size            1056968224 bytes
Database Buffers          570425344 bytes
Redo Buffers               13848576 bytes
Database mounted.
Database opened.
SQL>
```

4.3 查看并启动PDBS

SQL> show pdbs

```
SQL> show pdbs

    CON_ID CON_NAME                       OPEN MODE  RESTRICTED
---------- ------------------------------ ---------- ----------
         2 PDB$SEED                       READ ONLY  NO
         3 PDB1                           MOUNTED
         4 PDB2                           MOUNTED
```

SQL> alter pluggable database all open;

SQL> show pdbs;

```
SQL> alter pluggable database all open;

Pluggable database altered.

SQL> show pdbs;

    CON_ID CON_NAME                       OPEN MODE  RESTRICTED
---------- ------------------------------ ---------- ----------
         2 PDB$SEED                       READ ONLY  NO
         3 PDB1                           READ WRITE NO
         4 PDB2                           READ WRITE NO
```

4.4 查看监听器状态

[oracle@strong ~]$ lsnrctl status

```
[oracle@strong ~]$ lsnrctl status

LSNRCTL for Linux: Version 12.1.0.2.0 - Production on 05-JUN-2019 23:09:22

Copyright (c) 1991, 2014, Oracle.  All rights reserved.

Connecting to (ADDRESS=(PROTOCOL=tcp)(HOST=)(PORT=1521))
STATUS of the LISTENER
------------------------
Alias                     LISTENER
Version                   TNSLSNR for Linux: Version 12.1.0.2.0 - Production
Start Date                05-JUN-2019 22:55:54
Uptime                    0 days 0 hr. 13 min. 28 sec
Trace Level               off
Security                  ON: Local OS Authentication
SNMP                      OFF
Listener Log File         /u01/app/oracle/diag/tnslsnr/strong/listener/alert/log.xml
Listening Endpoints Summary...
  (DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=strong.oracle.com)(PORT=1521)))
Services Summary...
Service "cdb1" has 1 instance(s).
  Instance "cdb1", status READY, has 1 handler(s) for this service...
Service "cdb1XDB" has 1 instance(s).
  Instance "cdb1", status READY, has 1 handler(s) for this service...
Service "pdb1" has 1 instance(s).
  Instance "cdb1", status READY, has 1 handler(s) for this service...
Service "pdb2" has 1 instance(s).
  Instance "cdb1", status READY, has 1 handler(s) for this service...
The command completed successfully
```

4.5 查看EM Express配置

SQL> SELECT DBMS_XDB_CONFIG.GETHTTPPORT() FROM DUAL;

SQL> SELECT DBMS_XDB_CONFIG.GETHTTPSPORT FROM DUAL;

```
SQL> SELECT DBMS_XDB_CONFIG.GETHTTPPORT() FROM DUAL;

DBMS_XDB_CONFIG.GETHTTPPORT()
-----------------------------
                            0

SQL> SELECT DBMS_XDB_CONFIG.GETHTTPSPORT FROM DUAL;

GETHTTPSPORT
------------
           0
```

DBCA建库时，未勾选创建EM Express，故未配置，端口都为0。

4.6 CDB1配置EM Express

SQL> exec DBMS_XDB_CONFIG.setHTTPPort(5500);

SQL> SELECT DBMS_XDB_CONFIG.GETHTTPPORT() FROM DUAL;

```
SQL> exec DBMS_XDB_CONFIG.setHTTPPort(5500);

PL/SQL procedure successfully completed.

SQL> SELECT DBMS_XDB_CONFIG.GETHTTPPORT() FROM DUAL;

DBMS_XDB_CONFIG.GETHTTPPORT()
-----------------------------
                         5500
```

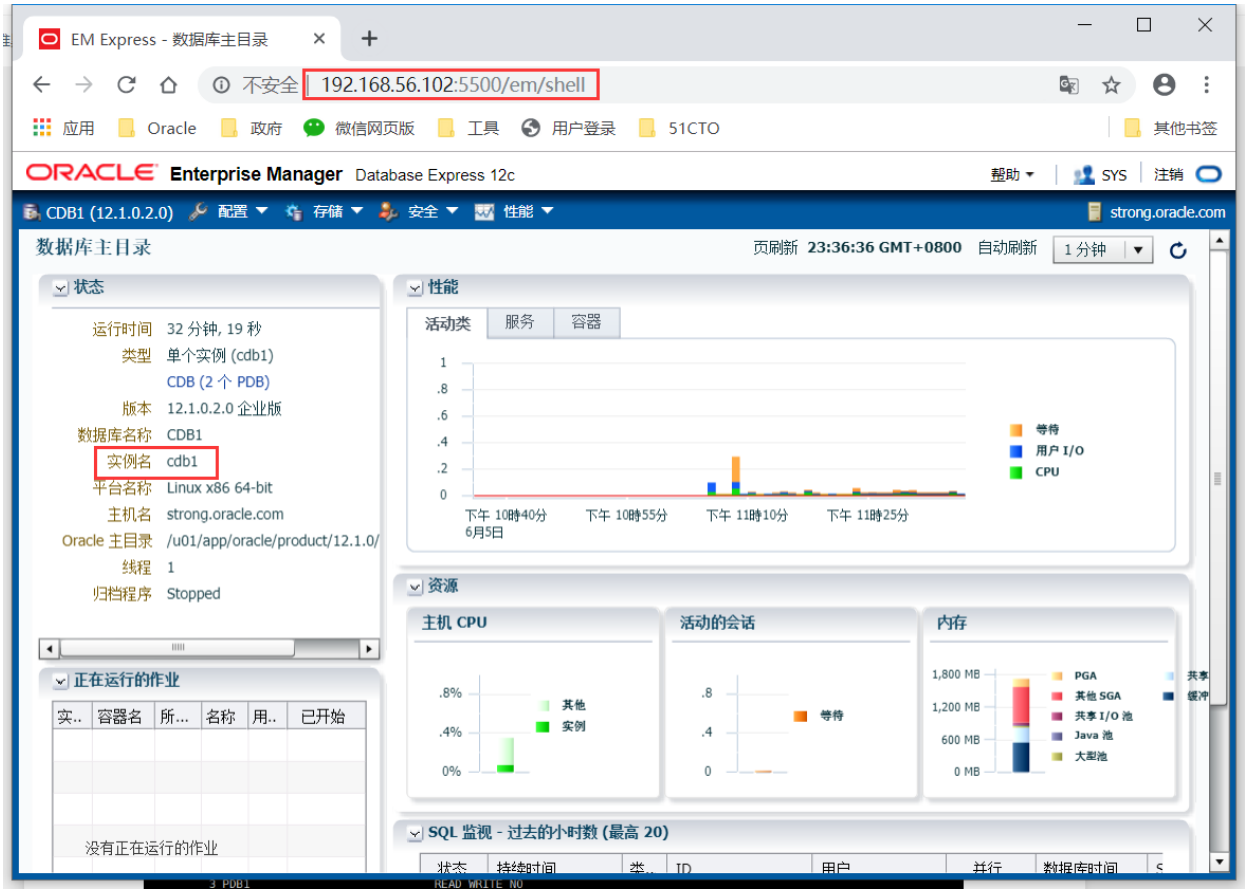
4.7 查看监听器状态

[oracle@strong ~]$ lsnrctl status

```
[oracle@strong ~]$ lsnrctl status

LSNRCTL for Linux: Version 12.1.0.2.0 - Production on 05-JUN-2019 23:19:23

Copyright (c) 1991, 2014, Oracle.  All rights reserved.

Connecting to (ADDRESS=(PROTOCOL=tcp)(HOST=)(PORT=1521))
STATUS of the LISTENER
------------------------
Alias                     LISTENER
Version                   TNSLSNR for Linux: Version 12.1.0.2.0 - Production
Start Date                05-JUN-2019 22:55:54
Uptime                    0 days 0 hr. 23 min. 29 sec
Trace Level               off
Security                  ON: Local OS Authentication
SNMP                      OFF
Listener Log File         /u01/app/oracle/diag/tnslsnr/strong/listener/alert/log.xml
Listening Endpoints Summary...
  (DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=strong.oracle.com)(PORT=1521)))
  (DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=strong.oracle.com)(PORT=5500))(Presentation=HTTP)(Session=RAW))
Services Summary...
Service "cdb1" has 1 instance(s).
  Instance "cdb1", status READY, has 1 handler(s) for this service...
Service "cdb1XDB" has 1 instance(s).
  Instance "cdb1", status READY, has 1 handler(s) for this service...
Service "pdb1" has 1 instance(s).
  Instance "cdb1", status READY, has 1 handler(s) for this service...
Service "pdb2" has 1 instance(s).
  Instance "cdb1", status READY, has 1 handler(s) for this service...
The command completed successfully
```

4.8 访问EM Express

http://192.168.56.102:5500/em



5 PDB 配置EM Express

目标：配置容器数据库PDB1使用EM Express，使用HTTP协议，端口为5501。

5.1 切换到PDB1

SQL> conn sys/system@192.168.56.102:1521/pdb1 as sysdba

SQL> show pdbs;

```
SQL> show pdbs;

    CON_ID CON_NAME                       OPEN MODE  RESTRICTED
---------- ------------------------------ ---------- ----------
         2 PDB$SEED                       READ ONLY  NO
         3 PDB1                           READ WRITE NO
         4 PDB2                           READ WRITE NO
SQL> conn sys/system@192.168.56.102:1521/pdb1 as sysdba
Connected.
SQL> show pdbs;

    CON_ID CON_NAME                       OPEN MODE  RESTRICTED
---------- ------------------------------ ---------- ----------
         3 PDB1                           READ WRITE NO
```

5.2 查看EM Express配置

SQL> SELECT DBMS_XDB_CONFIG.GETHTTPPORT() FROM DUAL;

SQL> SELECT DBMS_XDB_CONFIG.GETHTTPSPORT FROM DUAL;

```
SQL> SELECT DBMS_XDB_CONFIG.GETHTTPPORT() FROM DUAL;

DBMS_XDB_CONFIG.GETHTTPPORT()
-----------------------------
                            0

SQL> SELECT DBMS_XDB_CONFIG.GETHTTPSPORT FROM DUAL;

GETHTTPSPORT
------------
           0
```

5.3 PDB1配置EM Express

SQL> exec DBMS_XDB_CONFIG.setHTTPPort(5501);

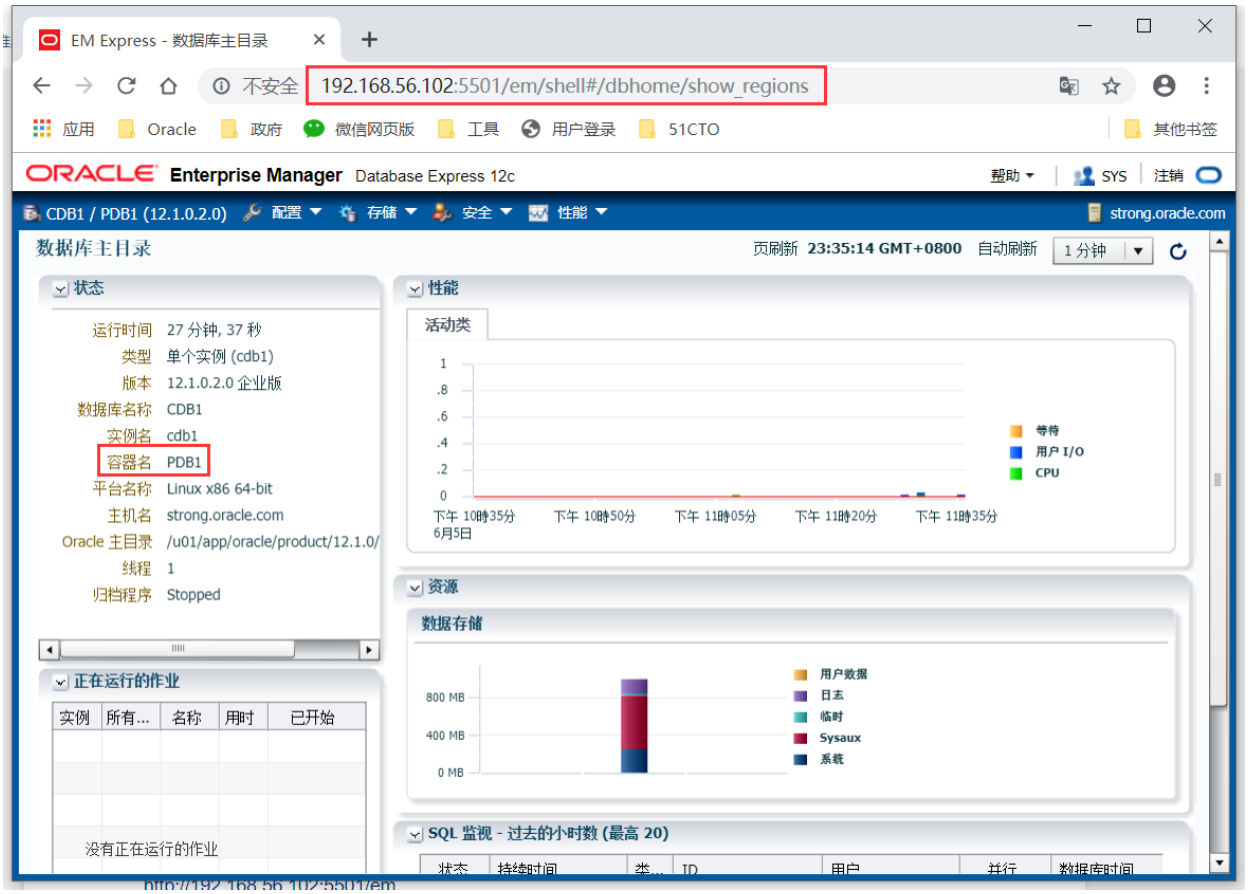
SQL> SELECT DBMS_XDB_CONFIG.GETHTTPPORT() FROM DUAL;

```
SQL> exec DBMS_XDB_CONFIG.setHTTPPort(5501);

PL/SQL procedure successfully completed.

SQL> SELECT DBMS_XDB_CONFIG.GETHTTPPORT() FROM DUAL;

DBMS_XDB_CONFIG.GETHTTPPORT()
-----------------------------
                         5501
```

5.4 查看监听器

[oracle@strong ~]$ lsnrctl status

```
[oracle@strong ~]$ lsnrctl status

LSNRCTL for Linux: Version 12.1.0.2.0 - Production on 05-JUN-2019 23:31:40

Copyright (c) 1991, 2014, Oracle.  All rights reserved.

Connecting to (ADDRESS=(PROTOCOL=tcp)(HOST=)(PORT=1521))
STATUS of the LISTENER
------------------------
Alias                     LISTENER
Version                   TNSLSNR for Linux: Version 12.1.0.2.0 - Production
Start Date                05-JUN-2019 22:55:54
Uptime                    0 days 0 hr. 35 min. 46 sec
Trace Level               off
Security                  ON: Local OS Authentication
SNMP                      OFF
Listener Log File         /u01/app/oracle/diag/tnslsnr/strong/listener/alert/log.xml
Listening Endpoints Summary...
  (DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=strong.oracle.com)(PORT=1521)))
  (DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=strong.oracle.com)(PORT=5500))(Presentation=HTTP)(Session=RAW))
  (DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=strong.oracle.com)(PORT=5501))(Presentation=HTTP)(Session=RAW))
Services Summary...
Service "cdb1" has 1 instance(s).
  Instance "cdb1", status READY, has 1 handler(s) for this service...
Service "cdb1XDB" has 1 instance(s).
  Instance "cdb1", status READY, has 1 handler(s) for this service...
Service "pdb1" has 1 instance(s).
  Instance "cdb1", status READY, has 1 handler(s) for this service...
Service "pdb2" has 1 instance(s).
  Instance "cdb1", status READY, has 1 handler(s) for this service...
The command completed successfully
```

5.5 访问EM Express

http://192.168.56.102:5501/em