Tivoli System Automation for Multiplatforms

Kósa Barna
Etalon-Informatika Kft.
barna.kosa@etaloninfo.hu

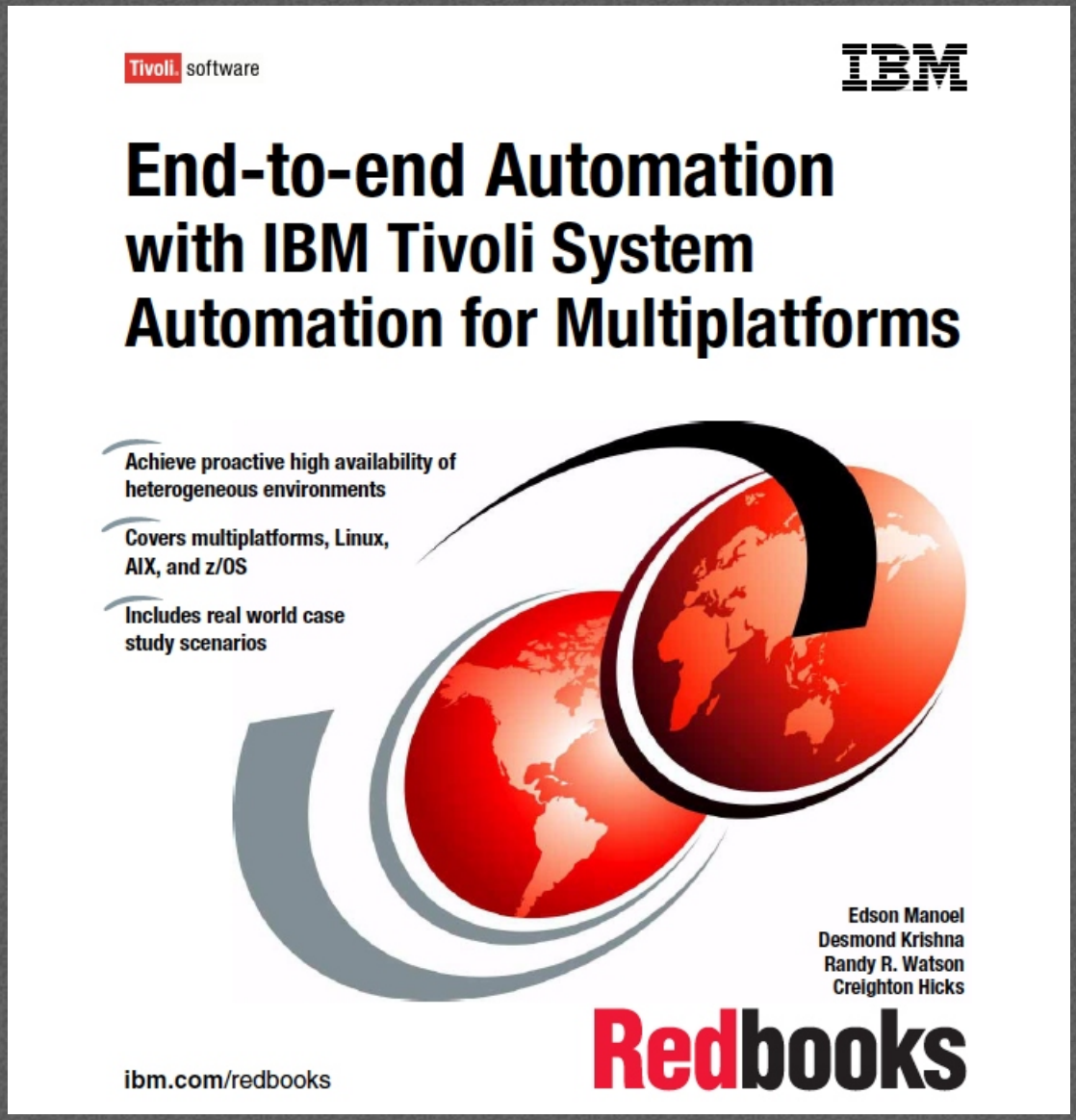
Mi a TSA

Magas rendelkezésre állást biztosító fürtözési megoldás nagyon fejlett automatizálási képességekkel.

Multiplatform

- AIX
- Linux (SLES 10, SLES 11, RHEL 5)
- Solaris
- Windows Server 2008 R1, Windows Server 2008 R2

Mi a TSA?


Tivoli software
IBM
End-to-end Automation with IBM Tivoli System Automation for Multiplatforms
Achieve proactive high availability of heterogeneous environments
Covers multiplatforms, Linux, AIX, and z/OS
Includes real world case study scenarios
Edson Manoel
Desmond Krishna
Randy R. Watson
Creighton Hicks
Redbooks
ibm.com/redbooks

Támogatott megoldások

out-of-the-box

- IBM DB2
- SAP
- IBM Tivoli Monitoring
- IBM Tivoli Change and Configuration ManagementDatabase (CCMDB)
- IBM Tivoli Application Dependency Discovery Manager
- IBM Tivoli Service Request Manager
- Oracle
- IBM Tivoli Storage Manager•IBMTivoli Enterprise Console
- IBM Tivoli Provisioning Manager
- IBM Tivoli Service Automation Manager
- IBM WebSphere®Application Server
- IBM WebSphere MQ
- IBM CloudBurst™
- IBM Netcool®Proviso

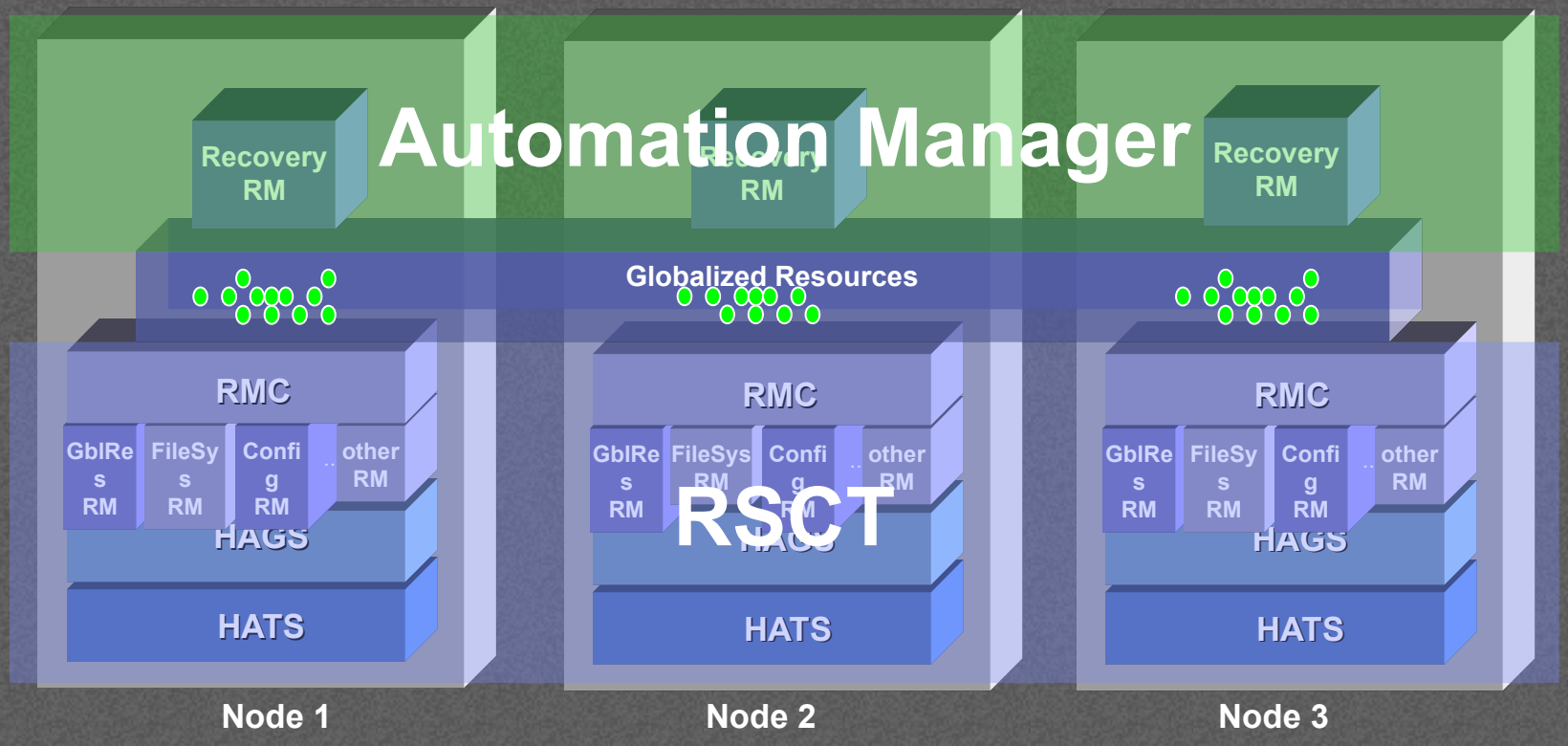
TSA komponensek

RSCT (Reliable Scalable Cluster Technology) – AIX-ból átvett cluster infrastruktúra

- heartbeat, monitorozás és kontroll, messaging, stb.

Automation Manager - TSA for z/OS-ből

- Maga az agy, automatizálás döntések szabályok alapján



TSA komponensek

RSCT – the "cluster software"

- **HATS** (**H**igh **A**vailability **T**opology **S**ervices)
  - provides a scalable heartbeat for adapter (network) and node failure detection
- **HAGS** (**H**igh **A**vailability **G**roup **S**ervices)
  - distributed node & process coordination, messaging, and synchronization service
- **RMC** (**R**esource **M**onitoring and **C**ontrol)
  - backbone of RSCT: it uses the Resource Managers to map RMC's resource and resource class abstraction to actual calls and commands that control the end resources
  - provides global access for configuring, monitoring, and controlling subsystems and resources throughout the cluster (also known as a peer domain for "HA" environments)
  - handles authorization, granting or denying resources based on some criteria using ACL files. Does not handle authentication which is determining the identity of a peer or subcomponent.
- **Configuration Resource Manager** (IBM.ConfigRM)
  - used in cluster definition (to create and administer a peer domain)
  - also used for quorum support

TSA komponensek

- **Tivoli System Automation – the "automation software"**

- **Recovery Resource Manager** (IBM.RecoveryRM)
  - This is the decision engine for IBM Tivoli System Automation and it consists of:
  - Resource Manager for **resource groups, equivalencies, managed resources** and **managed relationships**
  - Engine part: **logic deck** and **binder**
    - the **logic deck** is responsible for sending requests (start, stop) to resources to ensure the policy requirements
    - the **binder** is used to bind a resource on a node (select a constituent of a floating resource)

DB2 + TSA

IBM DB2 High Availability Instance Configuration Utility (db2haicu) – a DB2 és TSA integrációját biztosító eszköz.

A TSA és db2haicu csomagolva van a DB2 9.7-be

DB2 HADR

- HADR = High Avalability Disaster Recovery
- ”hot standby” adatbázis példány

db2haicu

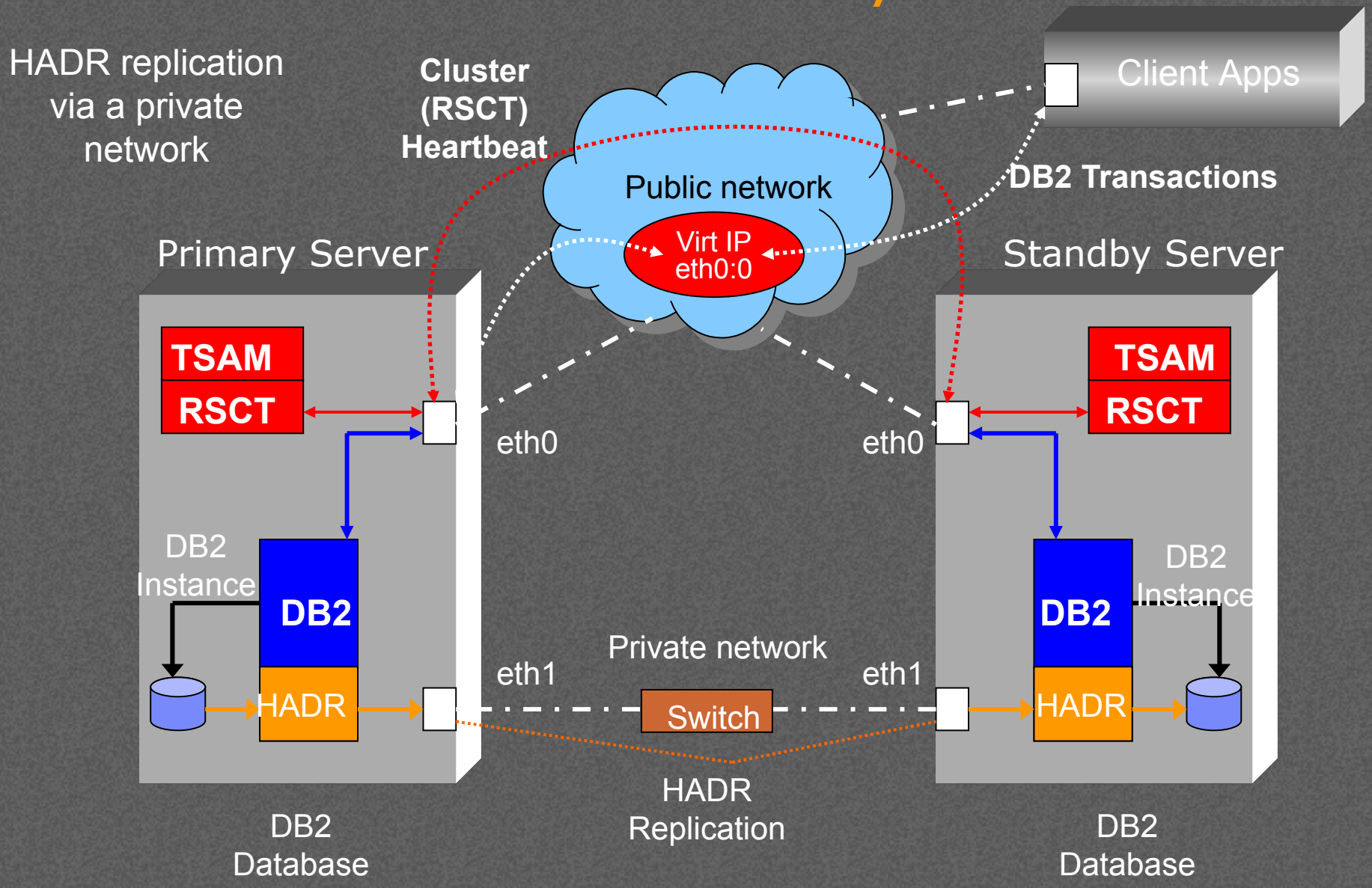
Automated Cluster Controlled HADR (High Availability Disaster Recovery) Configuration Setup using the IBM DB2 High Availability Instance Configuration Utility (db2haicu)

http://download.boulder.ibm.com/ibmdl/pub/software/dw/data/dm-0908hadrdb2haicu/HADR_db2haicu.pdf

Failover esetek:

- Másodlagos DB2 példány hiba
- Elsődleges DB2 példány hiba
- Tartalék NIC meghibásodás (publikus vagy privát)
- Elsődleges NIC meghibásodás (publikus vagy privát)
- Másodlagos szerver meghibásodás
- Elsődleges szerver meghibásodás

DB2 HADR környezet



DB2 TSA erőforrások

db2inst1 DB2 példány a node1 szerveren -> *db2_db2inst1_node1_0-rs*

db2inst1 DB2 példány a node2 szerveren -> *db2_db2inst1_node2_0-rs*

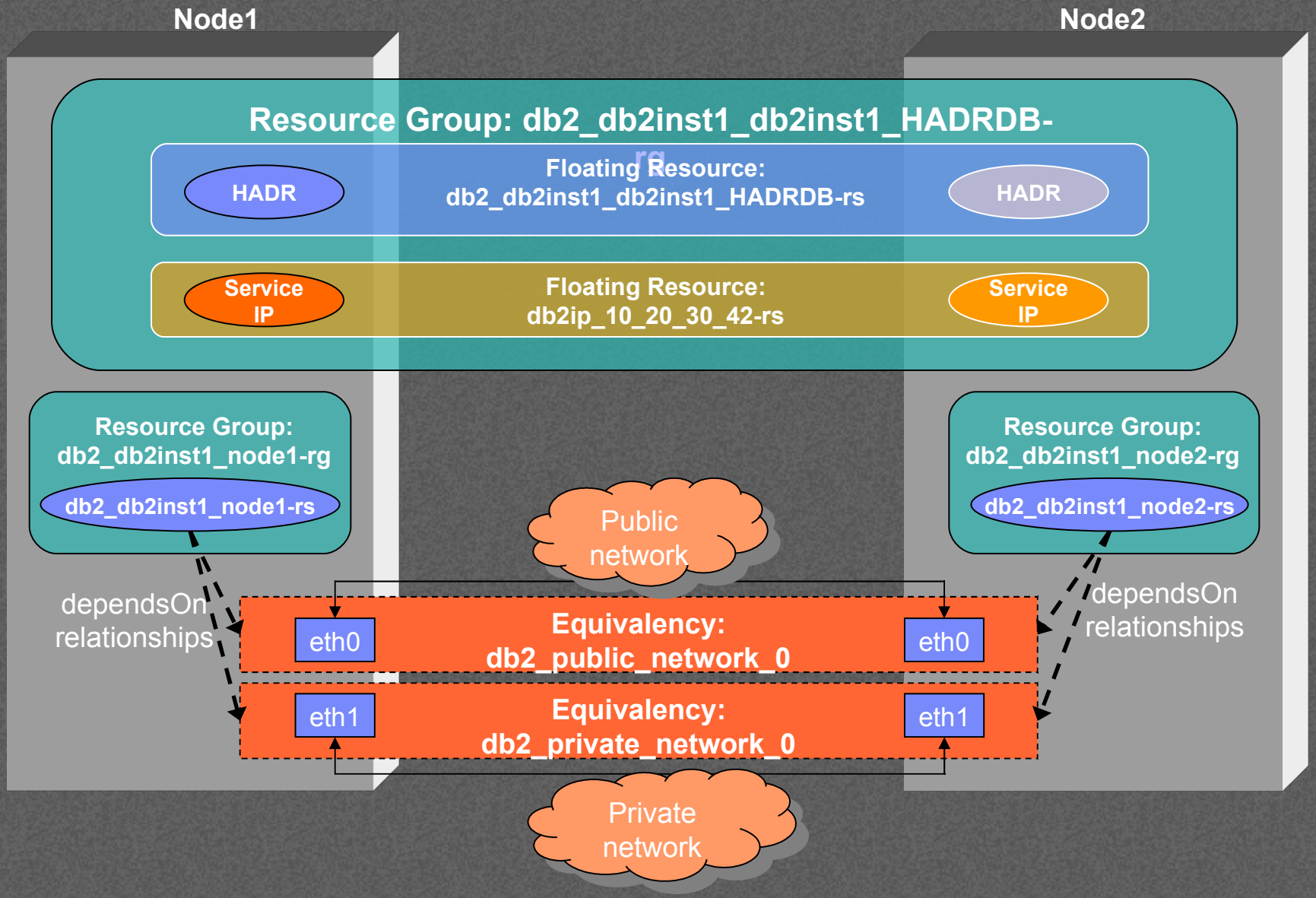
DB2 HADR adatbázis HADRDB, db2inst1 elsődleges és másodlagos példányok -> *db2_db2inst1_db2inst1_HADRDB-rs*

Virtuális IP cím XX.XX.XX.XX -> *db2ip_XX_XX_XX_XX-rs*

Publikus hálózat -> *db2_public_network_0*

Privát hálózat -> *db2_private_network_0*

DB2 TSA erőforrások



Példa konfiguráció

node-ok:	aix11, aix11
Peer domain:	tds_sa_domain
Resource:	tds_ip (mozgó IP cím)
Resource Group:	tds
Quorum:	mynetworktb

Konfigurálás

Két gépből álló fürt kialakítása (aix11 és aix12)

Reliable Scalable Cluster Technology (RSCT) szolgáltatás elindítása

```
# lssrc -a | grep ctrmc
 ctrmc            rsct                    inoperative
# startsrc -g rsct
0513-059 The ctcas Subsystem has been started. Subsystem PID
   is 8061090.
0513-059 The ctrmc Subsystem has been started. Subsystem PID
   is 8519804.
```

A fürt mindegyik tagján

Hozzáadni a ~/.profile fájlhoz

```
# export CT_MANAGEMENT_SCOPE=2
```

```
# preprpnode aix11 aix12
```

Konfigurálás

Peer domain létrehozása

```
# mkrpdomain tds_sa_domain aix11 aix12
# lsrpdomain
Name          OpState RSCTActiveVersion MixedVersions TSPort GSPort
tds_sa_domain Online  3.1.0.3           No            12347  12348
```

Fürt elindítása

```
# startrpdomain tds_sa_domain
# lsrpdomain
Name          OpState RSCTActiveVersion MixedVersions TSPort
   GSPort
tds_sa_domain Online  3.1.0.3           No            12347
   12348
# lssrc -ls IBM.RecoveryRM | grep Master
   Master Node Name      : aix12 (node number =  2)
```

Konfigurálás

Erőforrás fájl (resource definition file) létrehozása

appl.IBM.ServiceIP

```
PersistentResourceAttributes::
  NodeNameList={"aix11","aix12"}
  Name="tds_ip"
  NetMask=255.255.255.0
  IPAddress=192.168.0.35
  ResourceType=1
# mkrsrc -f appl.IBM.ServiceIP IBM.ServiceIP
NodeNameList = "{"aix11","aix12"}"
Name = ""tds_ip""
NetMask = "255.255.255.0"
IPAddress = "192.168.0.35"
ResourceType = "1"
```

Konfigurálás

```
# lsrsrc -l IBM.ServiceIP
Resource Persistent Attributes for IBM.ServiceIP
resource 1:
        Name                = "tds_ip"
        ResourceType        = 0
        AggregateResource = "0x2029 0xffff 0xa7d85d7d
   0x94545b98 0x923e9245 0xdddd9d4d"
        IPAddress           = "192.168.0.35"
        NetMask             = "255.255.255.0"
        ProtectionMode      = 1
        NetPrefix           = 0
        ActivePeerDomain    = "tds_sa_domain"
        NodeNameList        = {"aix11"}
```

Konfigurálás

```
resource 2:
        Name                = "tds_ip"
        ResourceType        = 0
        AggregateResource = "0x2029 0xffff 0xa7d85d7d
   0x94545b98 0x923e9245 0xdddd9d4d"
        IPAddress           = "192.168.0.35"
        NetMask             = "255.255.255.0"
        ProtectionMode      = 1
        NetPrefix           = 0
        ActivePeerDomain    = "tds_sa_domain"
        NodeNameList        = {"aix12"}
```

Konfigurálás

```
resource 3:
        Name                = "tds_ip"
        ResourceType        = 1
        AggregateResource = "0x3fff 0xffff 0x00000000
   0x00000000 0x00000000 0x00000000"
        IPAddress           = "192.168.0.35"
        NetMask             = "255.255.255.0"
        ProtectionMode      = 1
        NetPrefix           = 0
        ActivePeerDomain    = "tds_sa_domain"
        NodeNameList        = {"aix11","aix12"}
```

Konfigurálás

Erőforrás csoport (Resource Group) létrehozása

```
# mkrg tds
# addrgmbr -g tds IBM.ServiceIP:tds_ip
# lsrg -m
Displaying Member Resource information:
Class:Resource:Node[ManagedResource] Mandatory MemberOf
   OpState WinSource Location
IBM.ServiceIP:tds_SIP                True      tds
   Unknown
```

Erőforrás csoport elindítása

```
# chrg -o online tds
```

Konfigurálás

```
# lsrg -g tds
Displaying Resource Group information:
For Resource Group "tds".

Resource Group 1:
        Name                    = tds
        MemberLocation          = Collocated
        Priority                = 0
        AllowedNode             = ALL
        NominalState            = Online
        ExcludedList            = {}
        Subscription            = {}
        Owner                   =
        Description             =
```

Konfigurálás

```
        InfoLink                = 
        Requests                = {}
        Force                   = 0
        ActivePeerDomain        = tds_sa_domain
        OpState                 = Online
        TopGroup                = tds
        ConfigValidity          = 
        TopGroupNominalState = Online
# lssam
Online IBM.ResourceGroup:tds Nominal=Online
        '- Online IBM.ServiceIP:tds_ip
                |- Online IBM.ServiceIP:tds_ip:aix11
                '- Offline IBM.ServiceIP:tds_ip:aix12
```

Konfigurálás

Az erőforrást futtató szerver leállítása. Nincs quorum, az erőforrás nem indul el a másik szerveren.

```
# stoprpnode -f aix11
# lssam
Pending online IBM.ResourceGroup:tds Control=MemberInProblemState
   Nominal=Online
     '- Unknown IBM.ServiceIP:tds_ip Control=MemberInProblemState
        |- Failed offline IBM.ServiceIP:tds_ip:aix11 Node=Offline
        '- Offline IBM.ServiceIP:tds_ip:aix12
```

Konfigurálás

Quorum biztosítása

quorum = határozatképesség

Tie breaker típusok

- Operator – operátor kell döntsön
- Fail – pseudo
- SCSI (Linux), DISK (AIX) – SCSI reserve, persistent reserve
- ECKD (Linux on System z)
- EXEC – végrehajtható program (samtb_net)

```
# mkrsrc IBM.TieBreaker Type="EXEC" Name="mynetworktb"
      DeviceInfo='PATHNAME=/usr/sbin/rsct/bin/samtb_net
      Address=192.168.0.33 Log=1' PostReserveWaitTime=10
# chrsrc -c IBM.PeerNode OpQuorumTieBreaker="mynetworktb"
```

Konfigurálás

```
# lsrsrc IBM.TieBreaker
Resource Persistent Attributes for IBM.TieBreaker
resource 1:
        Name                = "mynetworktb"
        Type                = "EXEC"
        DeviceInfo          =
   "PATHNAME=/usr/sbin/rsct/bin/samtb_net
   Address=192.168.0.234 Log=1"
        ReprobeData         = ""
        ReleaseRetryPeriod  = 0
        HeartbeatPeriod     = 0
        PreReserveWaitTime  = 0
        PostReserveWaitTime = 10
        NodeInfo            = {}
        ActivePeerDomain    = "tds_sa_domain"
```

Konfigurálás

```
resource 2:
        Name                    = "Fail"
        Type                    = "Fail"
        DeviceInfo              = ""
        ReprobeData             = ""
        ReleaseRetryPeriod      = 0
        HeartbeatPeriod         = 0
        PreReserveWaitTime      = 0
        PostReserveWaitTime     = 0
        NodeInfo                = {}
        ActivePeerDomain        = "tds_sa_domain"
```

Konfigurálás

```
resource 3:
        Name                    = "Operator"
        Type                    = "Operator"
        DeviceInfo              = ""
        ReprobeData             = ""
        ReleaseRetryPeriod      = 0
        HeartbeatPeriod         = 0
        PreReserveWaitTime      = 0
        PostReserveWaitTime     = 0
        NodeInfo                = {}
        ActivePeerDomain        = "tds_sa_domain"
```

Konfigurálás

```
# file /usr/sbin/rsct/bin/samtb_net
/usr/sbin/rsct/bin/samtb_net: shell script

#-------------------------------------------------------------------------#
# samtb_net  A custom tie-breaker, uses a third IP instance to resolve tie #
#            sam_nettb is the tie-breaker exec itself, but also provides  #
#            some command line functions to setup and activate the tb.    #
#-------------------------------------------------------------------------#
```

Konfigurálás

```
# lsrsrc -c IBM.PeerNode
Resource Class Persistent Attributes for IBM.PeerNode
resource 1:
        CommittedRSCTVersion  = ""
        ActiveVersionChanging = 0
        OpQuorumOverride      = 0
        CritRsrcProtMethod    = 1
        OpQuorumTieBreaker    = "mynetworktb"
        QuorumType            = 0
        QuorumGroupName       = ""
        Fanout                = 32
        OpFenceGroup          = ""
        NodeCleanupCommand    = ""
        NodeCleanupCriteria   = ""
# lssrc -ls IBM.RecoveryRM | grep "Operational Quorum State:"
   Operational Quorum State: HAS_QUORUM
```

Fürt működésének ellenőrzése

Az aix12 szerveren

```
# lssam
Online IBM.ResourceGroup:tds Nominal=Online
        '- Online IBM.ServiceIP:tds_ip
                |- Online IBM.ServiceIP:tds_ip:aix11
                '- Offline IBM.ServiceIP:tds_ip:aix12
# stoprpnode -f aix11
# lssam
Online IBM.ResourceGroup:tds Control=MemberInProblemState Nominal=Online
   '- Online IBM.ServiceIP:tds_ip Control=MemberInProblemState
      |- Failed offline IBM.ServiceIP:tds_ip:aix11 Node=Offline
      '- Online IBM.ServiceIP:tds_ip:aix12
```

Fürt működésének ellenőrzése

```
# startrpnode aix11
# lssam
Online IBM.ResourceGroup:tds Control=MemberInProblemState Nominal=Online
   '- Online IBM.ServiceIP:tds_ip Control=MemberInProblemState
      |- Offline IBM.ServiceIP:tds_ip:aix11
      '- Online IBM.ServiceIP:tds_ip:aix12
```