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Open Source Telephony

Integrating Asterisk & ooRexx
To Transition An IVR Platform
Into the 21st Century

Original Solution

- OS/2 Based
  - No Support
- Classic Rexx
  - Prevented Progress
- Closed Source
  - No Enhancement

Potential Solution 1

- Solution From Current Vendor
  - Pros
    - No Change In IVR Applications
    - ooRexx Support
  - Cons
    - Closed Source
    - Lack Of Support

Potential Solution 2

- Solution From Current Vendor
  - Pros
    - TCP/IP Socket Based
    - Provided Some Redundancy Options
  - Cons
    - Closed Source
    - Required Rewrite or Abstraction Interface
    - Lack of Documentation & Support

Potential Solution 3

- Asterisk
  - Pros
    - Open Source
    - Linux Based
    - Scalable
    - Very Well Supported
  - Cons
    - Required Abstraction Interface

Selected Solution

- Asterisk
  - Implementation Goals
    - Minimize IVR Developmental Changes
    - Seamless Conversion
    - Redundancy
    - Scalability

Solution Goals

- Call Handling
  - Route To Least Utilized Asterisk Server
  - Bridged To Least Utilized IVR Server
- IVR Execution
  - IVR Executes Unchanged
  - Any IVR <-> Any Server

Solution Goals

- Image Based Server Deployment
  - Minimize Configuration Needed To Bring New or Replacement Servers On-line
    - (No Configuration Needed For Asterisk Server)
  - Ease Provisioning of New Servers
    - Enhances Scalability

Solution Goals

- Web Based Management/Monitoring
  - Comprehensive Monitor & Management
    - Enable/Disable Any Individual Server
      - Allows Removing Server From Service
    - High-level & Detailed Call Information
    - Ongoing Development

Solution Development Notes

- **Everything Other Then Asterisk Written In ooRexx!!**
  - From the server components to the web based interface
- Inter-Server Communication
  - TCP/IP Sockets

Solution Development Notes

- ooRexx interfaces to Asterisk
  - AGI
    - Conceptually Similar To CGI
      - Redirects stdin, stdout, stderr
  - ExternalIVR
    - Not As Flexible, But Buffers TouchTones

Solution Components

- Asterisk Main (Linux)
  - Converts Calls to VoIP
  - Routes to Least Used Asterisk Node
    - ooRexx AGI Script
    - Gets Least Used Node From MServer

Solution Components

- MServer (Linux/Windows)
  - Monitors Load on Asterisk Cluster Nodes
    - Connects to Asterisk Management Interface
  - Activates/Deactivates Asterisk Nodes
    - Driven From Website

Solution Components

- Asterisk Cluster Node (Linux)
  - Starts UCS Client
    - ooRexx ExternalIVR Script
  - UCS Client
    - Gets Least Used UCS Node From UServer
    - Connects to UCS Node
    - Fails over to Next Available UCS Node

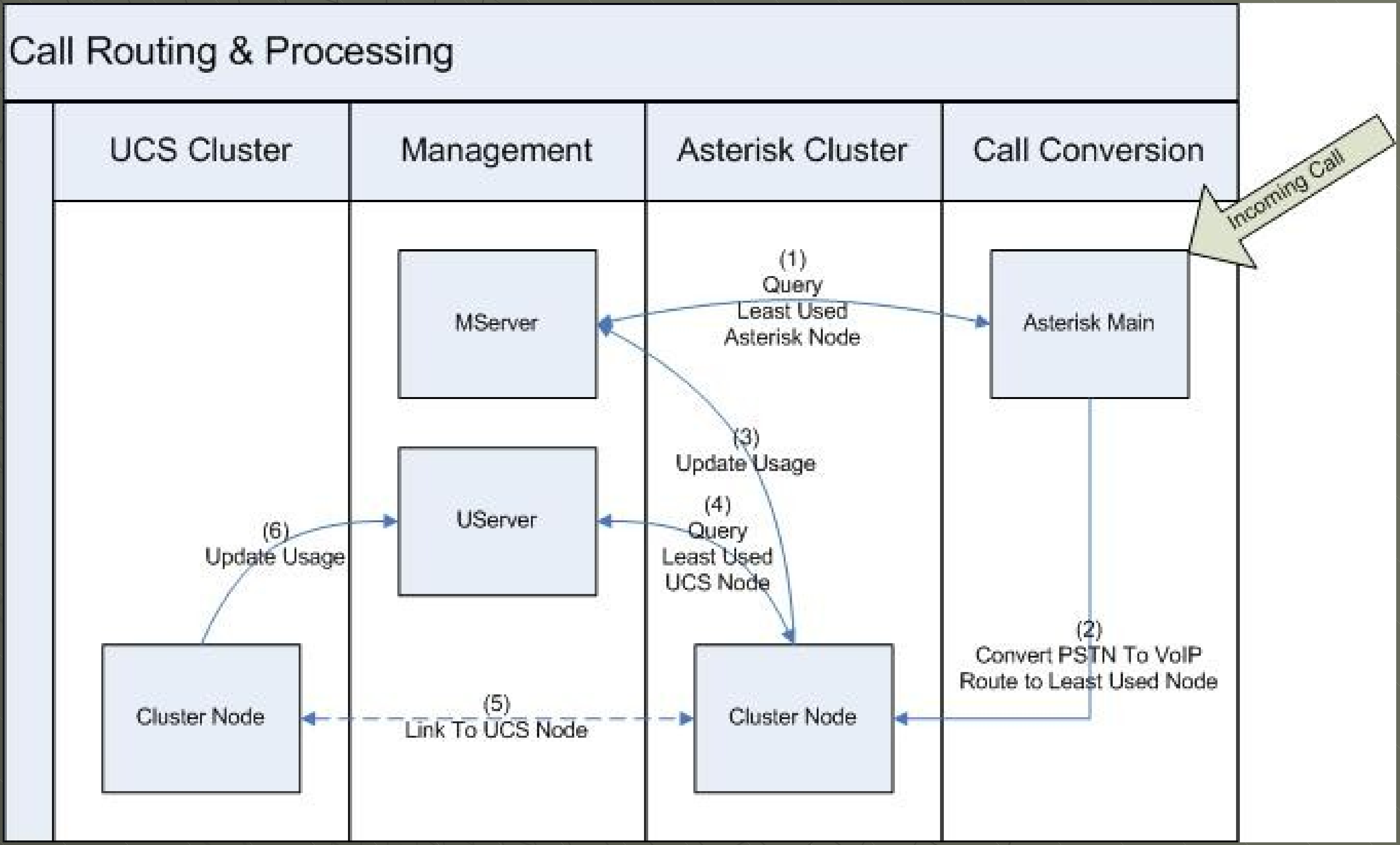
Solution Components

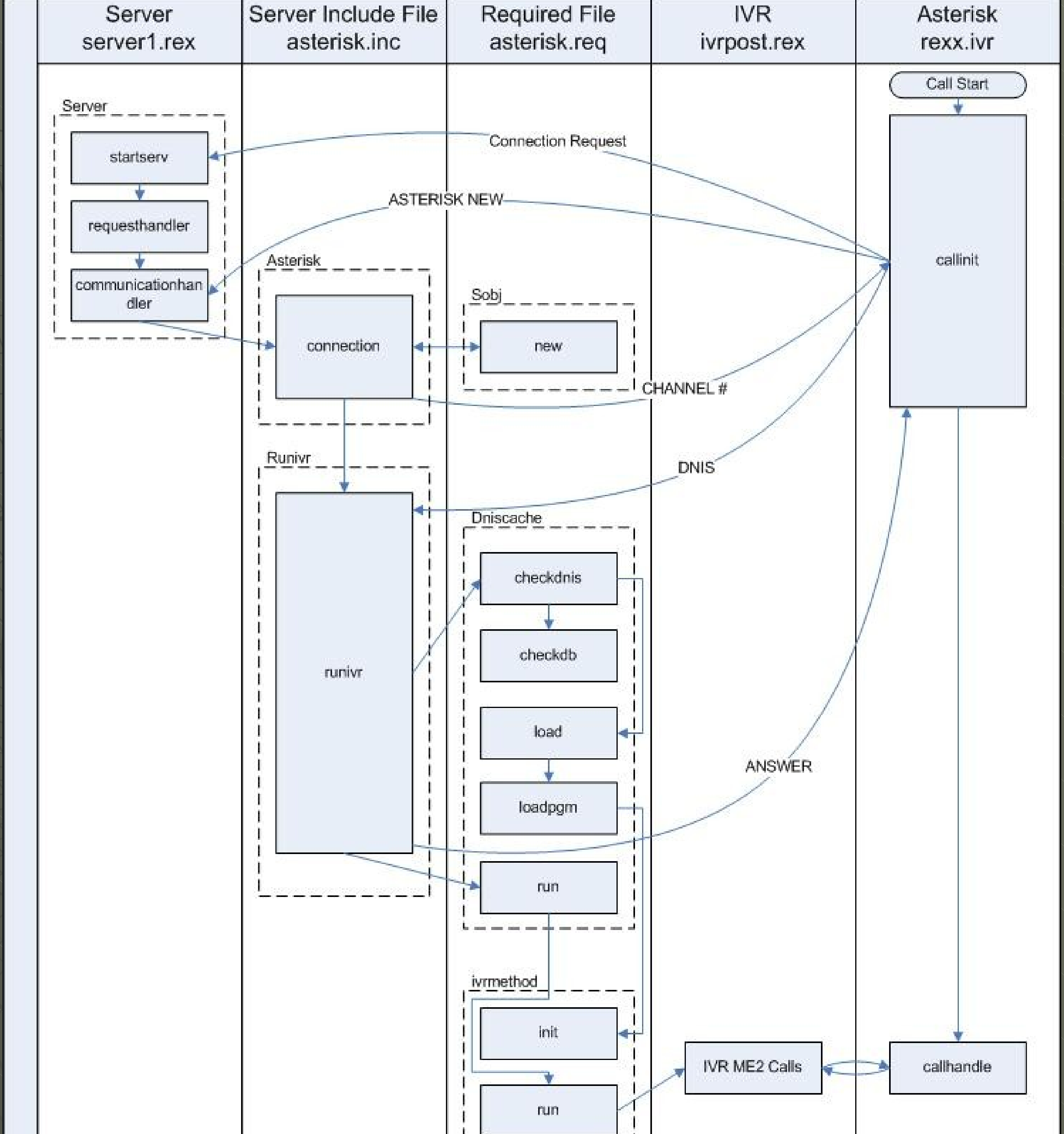
- UServer (Linux/Windows)
  - UCS Servers Connect and Update Load
    - Doesn’t Route to Disconnected Nodes
  - Activates/Deactivates UCS Nodes
    - Driven From Website

Solution Components

- UCS Server (Windows)
  - Executes IVR Scripts
  - Modular
    - Support New Development
    - IIR Clients
    - AJAX Clients
    - Etc

Process Communication




Server
server1.rex
Server Include File
asterisk.inc
Required File
asterisk.req
IVR
ivrpost.rex
Asterisk
rexx.ivr
Call Start
Server
startserv
requesthandler
communicationhandler
Connection Request
ASTERISK NEW
callinit
Asterisk
connection
Sobj
new
CHANNEL #
Runivr
runivr
DNIS
Dniscache
checkdnis
checkdb
load
loadpgm
run
ANSWER
ivrmethod
init
run
IVR ME2 Calls
callhandle

Design

- Modified IVRs
  - Method Objects Instead Of Files
- Inter-thread Communication
  - Global Variables (.local)
  - Methods
  - Queues
    - Allows Blocking
- Inter-Process Communication
  - TCP/IP Sockets

Tips & Tricks

```
call on user setvar


myroutine: procedure
  ....
raise user setvar additional (vars) return


setvar:
    do i = 1 to condition('a')~words() by 2
        call value condition('a')~word(i), condition('a')~word(i + 1)
    end
return
```

Tips & Tricks

```
/*  required ooRexx file  */

.local~myobject = .myobject

::class myobject
...
```

References

- Asterisk (Telephony Software)
  - http://www.asterisk.org
- Sangoma (Telephony Hardware)
  - http://www.sangoma.com