

# TestAndDiagnostic



This page is under development

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## Introduction

TAD (Test And Diagnostic) monitors the amount of free memory available in the system at run time. It triggers the memory/Resource Reclamation (RR) process in TDM, when the amount of free memory drops below a configurable threshold. RR process can also be triggered by memory allocation failures which results in a notification being sent to TDM to try to reclaim memory.

Selfheal is another feature implemented in Test And Diagnostic Component.

Self-heal monitors:

- CPU usage
- Memory Usage
- Critical RDK-B processes

Self-heal stores Reset Count and Reboot Count.

Self-heal takes required action like: Rebooting the device, Restarting required process based on predefined conditions.

Self-heal does connectivity test.

## Feature

### Selfheal – Resource Monitoring

Monitors the resources periodically (eg: 15 mins). If "Average Memory Used" reaches threshold value, necessary action will be executed.

"resource\_monitor.sh" script is used for monitoring Memory and CPU usage.

Located in the device path: "/fss/gw/usr/ccsp/tad/resource\_monitor.sh".

### Selfheal – Process Monitoring

Monitors the processes periodically (eg: 15 mins) based on process id (pid). Based on the process id availability, required action will be taken such as restarting the process, rebooting the device.

"task\_health\_monitor.sh" script is used for monitoring RDK-B processes. This is located at path: "/fss/gw/usr/ccsp/tad/task\_health\_monitor.sh". We can monitor any RDK-B processes by adding the process pid in this script.

Self-heal stores Reset Count and Reboot Count

### Selfheal – Connectivity Test

Self-heal does connectivity test. Ping test will be done through server IP/URI (this needs to be configured). If server IP/URI is not configured, Ping test won't be executed and no action will be taken. If server is configured and ping test fails, reboot action will be executed.

"self\_heal\_connectivity\_test.sh" script is used for ping test

### Selfheal – Action

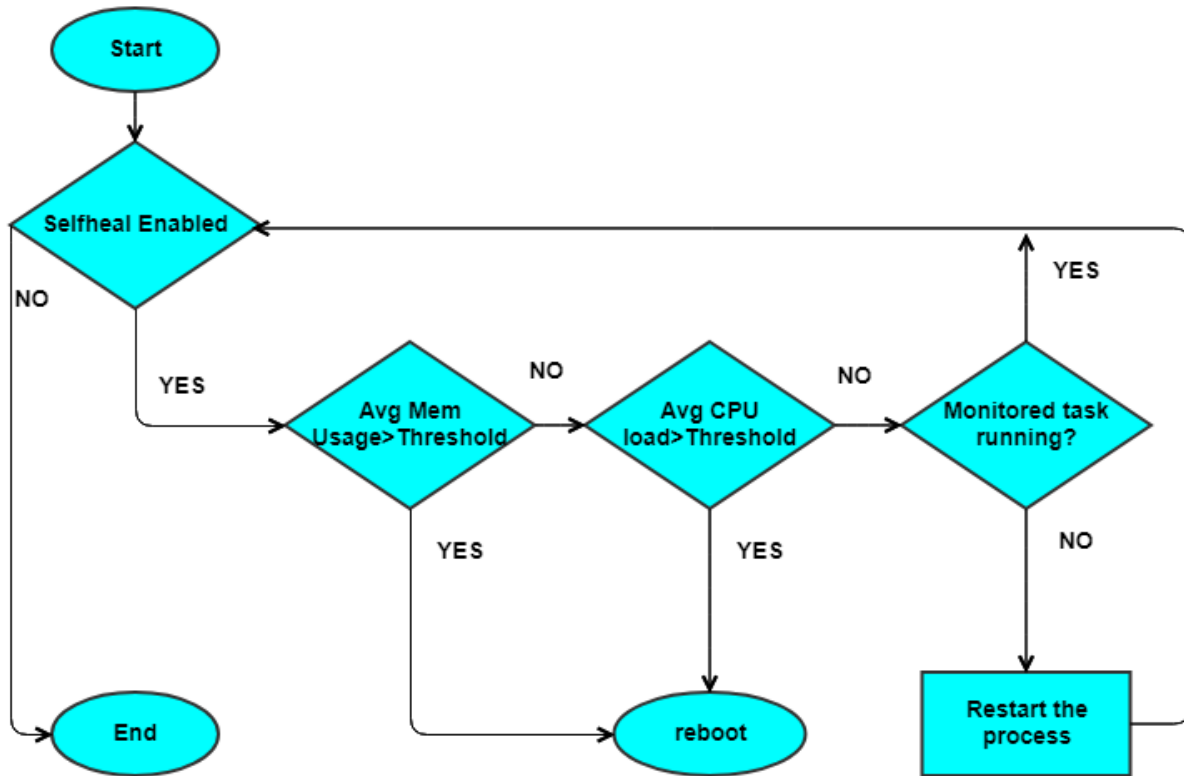
Self-heal takes the required action through "corrective\_action.sh" script. This script has implementation of the actions.

Some of the actions are:

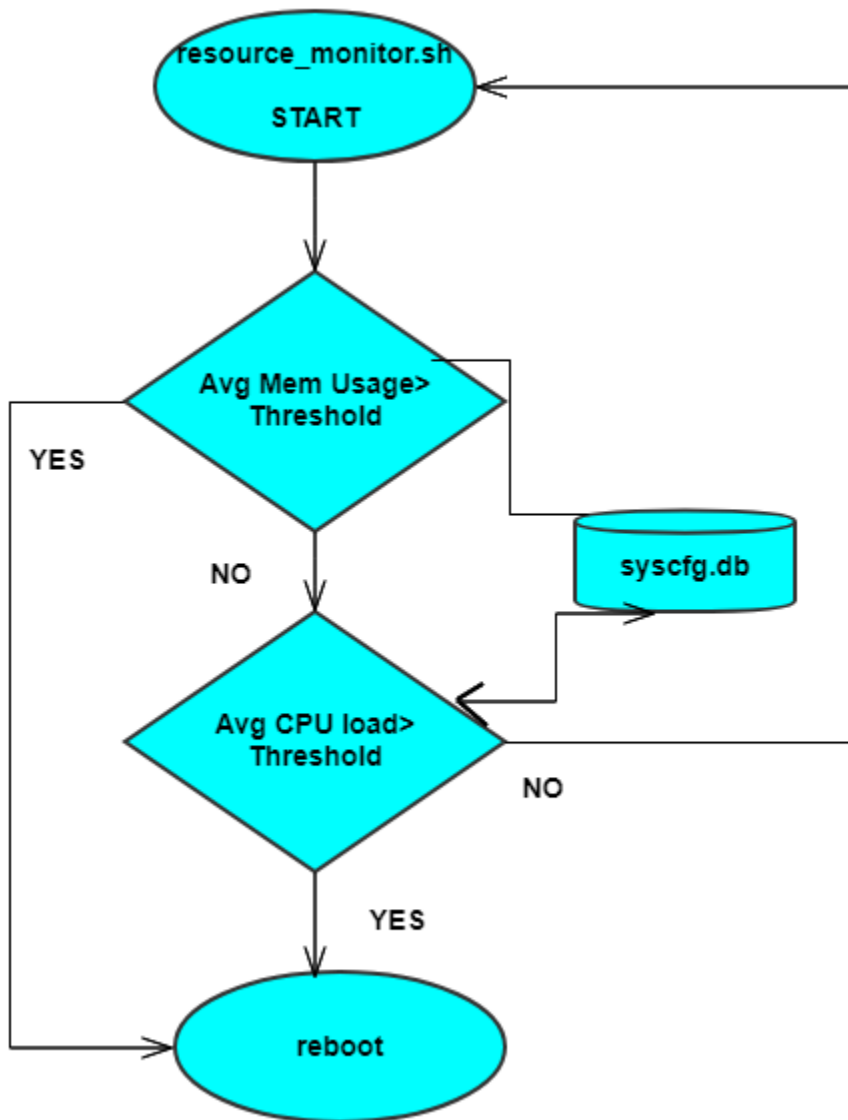
rebootNeeded - Reboots the device  
resetNeeded - Restarts the required process  
storeInformation - Stores Memory and CPU usage

In Raspberry Pi the functionality of self-heal feature is provided by systemd.

## Code Flow

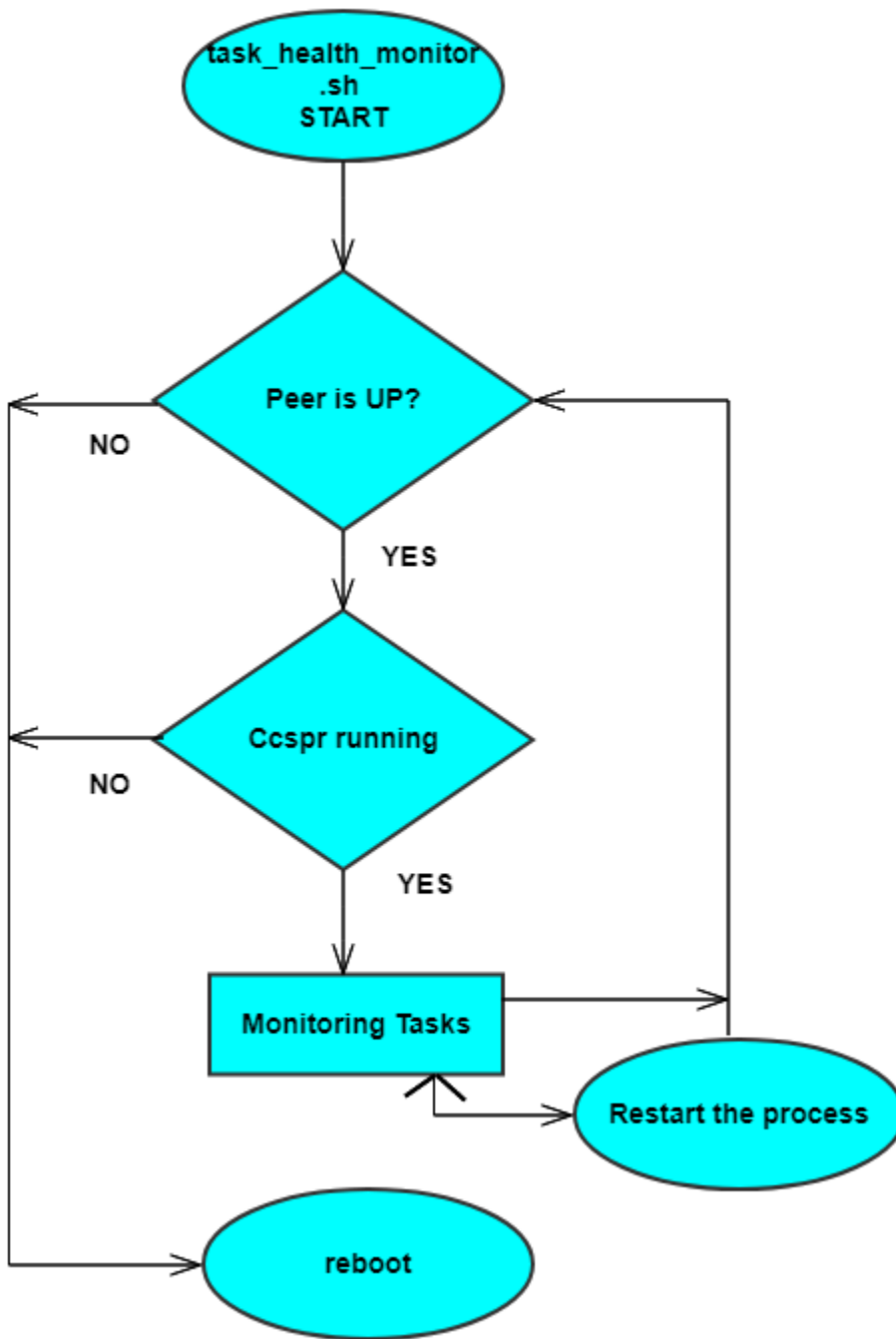


Resource Monitoring - resource\_monitor.sh



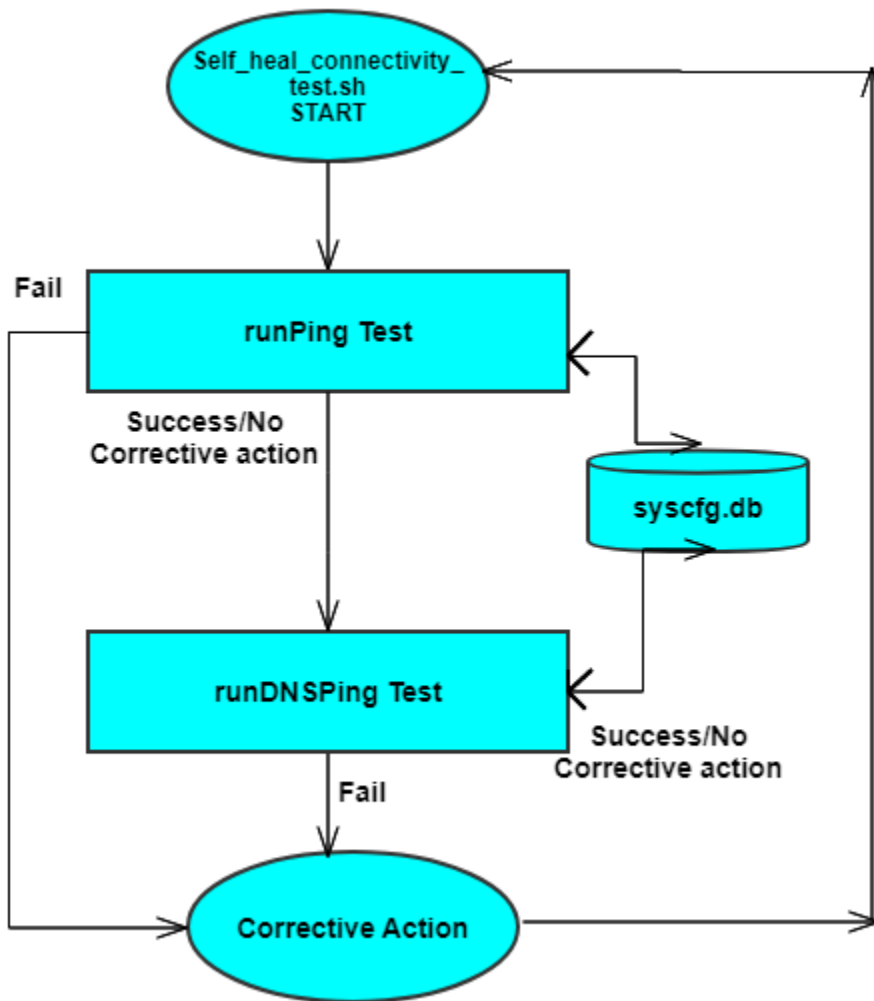
- `resource_monitor.sh` monitors the Memory and CPU usage
- Average memory and CPU thresholds will be obtained from `syscfg.db` (default `avg_cpu_threshold:100`, `avg_memory_threshold:100`)
- Memory Usage Monitor
  - Gets the total, free and used memory details using `free` command
  - $\text{AvgMemUsed} = \text{usedMem} * 100 / \text{totalMem}$
  - if `AvgMemUsed > memory_threshold`, device will be rebooted
- CPU Usage Monitor
  - Active CPU is considered as sum of user, system, iowait, irq, softirq, steal cpu
  - CPU usage difference in every 30 seconds for a period of 5 mins, is considered as an `Curr_CPULoad_Avg`.
  - If `Curr_CPULoad_Avg > cpu_threshold`, corrective action will be taken

Process Monitoring - `task_health_monitor.sh`



- `task_health_monitor.sh` monitors the status of various tasks periodically and takes the corrective action
- Default monitoring interval is 15mins and can be modified using `resource_monitor_interval` in `sycfg.db`
- Monitors
  - Health of peer processor, in case of dual core processors
  - Other tasks added as part of the script
- New tasks can be added by editing the script

Connectivity Test - `self_heal_connectivity_test.sh`



- Self\_heal\_connectivity\_test.sh will run Ping and DNS tests.
- ConnTest\_PingInterval in syscfg.db specifies the frequency of the connectivity test.
- If nothing specified, it is 60seconds by default.

- **runPingTest**
  - Gets the IP (default\_router IP) from syscfg.db
  - If no IP specified, it will try pinging to default gw
  - If ping fails, takes the corrective action, which is none by default.
- **runDNSPingTest**
  - This is disabled by default. Can be enabled by selfheal\_dns\_pingtest\_enable in syscfg.db
  - Gets the urlToVerify from syscfg.db
  - If nslookup fails, takes the corrective action, which is none by default

## Objects

Self heal objects in its DML layer:

Device.SelfHeal.X\_RDKCENTRAL-COM

Self heal can be Enabled/disabled by the below data model. By default, it is enabled

```
$ dmcli eRT getv Device.SelfHeal.X_RDKCENTRAL-COM_Enable
CR component name is: eRT.com.cisco.spvtg.ccsp.CR
subsystem_prefix eRT.
getv from/to component(eRT.com.cisco.spvtg.ccsp.tdm): Device.SelfHeal.X_RDKCENTRAL-COM_Enable
Execution succeed.
Parameter      1 name: Device.SelfHeal.X_RDKCENTRAL-COM_Enable
                type:      bool,      value: true
```

Verify the selfheal feature running status

```
$ ps -Af | grep -i self
4449 root      0:00 {self_heal_conne} /bin/sh /usr/ccsp/tad/self_heal_connectivity_test.sh
18921 root     0:00 grep -i self
```

## Resource monitoring

The Below DM is used to verify the Average CPU threshold. By default the value is set to 100

```
$ dmcli eRT getv Device.SelfHeal.ResourceMonitor.X_RDKCENTRAL-COM_AvgCPUThreshold
CR component name is: eRT.com.cisco.spvtg.ccsp.CR
subsystem_prefix eRT.
getv from/to component(eRT.com.cisco.spvtg.ccsp.tdm): Device.SelfHeal.ResourceMonitor.X_RDKCENTRAL-
COM_AvgCPUThreshold
Execution succeed.
Parameter      1 name: Device.SelfHeal.ResourceMonitor.X_RDKCENTRAL-COM_AvgCPUThreshold
                type:      uint,      value: 100
```

The Below DM is used to verify the Average Memory threshold. By default the value is set to 100

```
$ dmcli eRT getv Device.SelfHeal.ResourceMonitor.X_RDKCENTRAL-COM_AvgMemoryThreshold
CR component name is: eRT.com.cisco.spvtg.ccsp.CR
subsystem_prefix eRT.
getv from/to component(eRT.com.cisco.spvtg.ccsp.tdm): Device.SelfHeal.ResourceMonitor.X_RDKCENTRAL-
COM_AvgMemoryThreshold
Execution succeed.
Parameter      1 name: Device.SelfHeal.ResourceMonitor.X_RDKCENTRAL-COM_AvgMemoryThreshold
                type:      uint,      value: 100
```