oneDoc

Automated code generation on Triage wikis

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Problem Statement

- Today we have multiple documents to study a feature. Example : Cisco wiki, twiki ,techzone , ddts , TAC articles , email conversations.
- To fully understand and properly debug any problem, we need to search multiple documents related to the same feature.
- Often the information is scattered through multiple documents . A feature may have good description in SFS , configurations might be put up in a techzone article , tweaks and debuggability features might be in a ddts or email conversations .
- Sometimes the same information is available in multiple documents , confusing the developer or user which one to refer to .

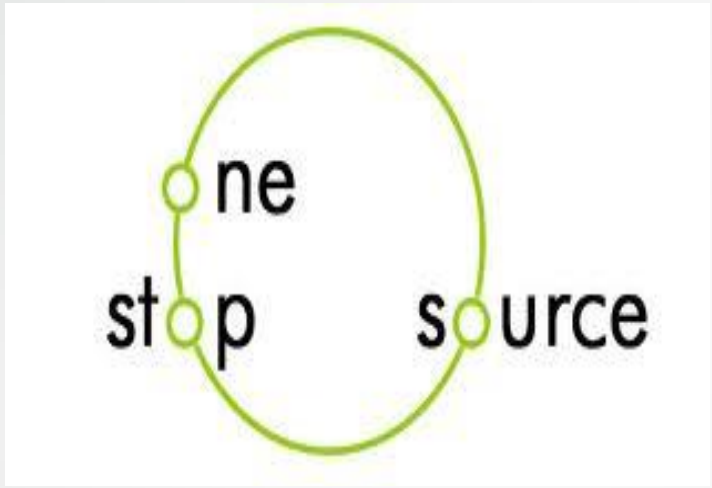

Multiple docs
Various formats
Difficult to use
Scattered information
Information Duplication
Maintenance nightmare

Solution

- Define one standard format for all features , components and platforms.
- Model generated through UI using model template and user input
- Developers and testers can continuously update the models . The quantity and quality of the models improve with time and effort leading to better information searching and debuggability .
- Traverse through the decision tree to pinpoint any issues or get complete feature information including dependencies and subsystems.

What exists

Information is scattered in
Wiki
SFS
TAC TOI
Deepdive
Test plans, C bugs, cs-emails



<u>How we troubleshoot today:</u>

Need subject matter expert
Traverse through all docs
Collect information
Need different subject matter expert if not our component

oneDoc

Transforms to an all new model

- ***Single standard template***
- ***Not dependent on component, platform, OS***
- ***One stop information model***
- ***UI to generate the model with data from user- User need not learn a new format to write the data.***
- ***Modularity enables us to store the data in any format, json, xml or anything else.***
- ***Format can be changed at any point without affecting any of the users.***

The two aspects of the solution

- Model generation based on a UI
- Application that would take the model as input , build a decision tree and traverse the decision tree and solve/pinpoint the problem.

UI to generate models

FEATURE DESCRIPTION

Enter feature name

smand

Enter the show command

nile debug qnodes 0 0 4096

Enter the cli description

Find the number of qnodes used

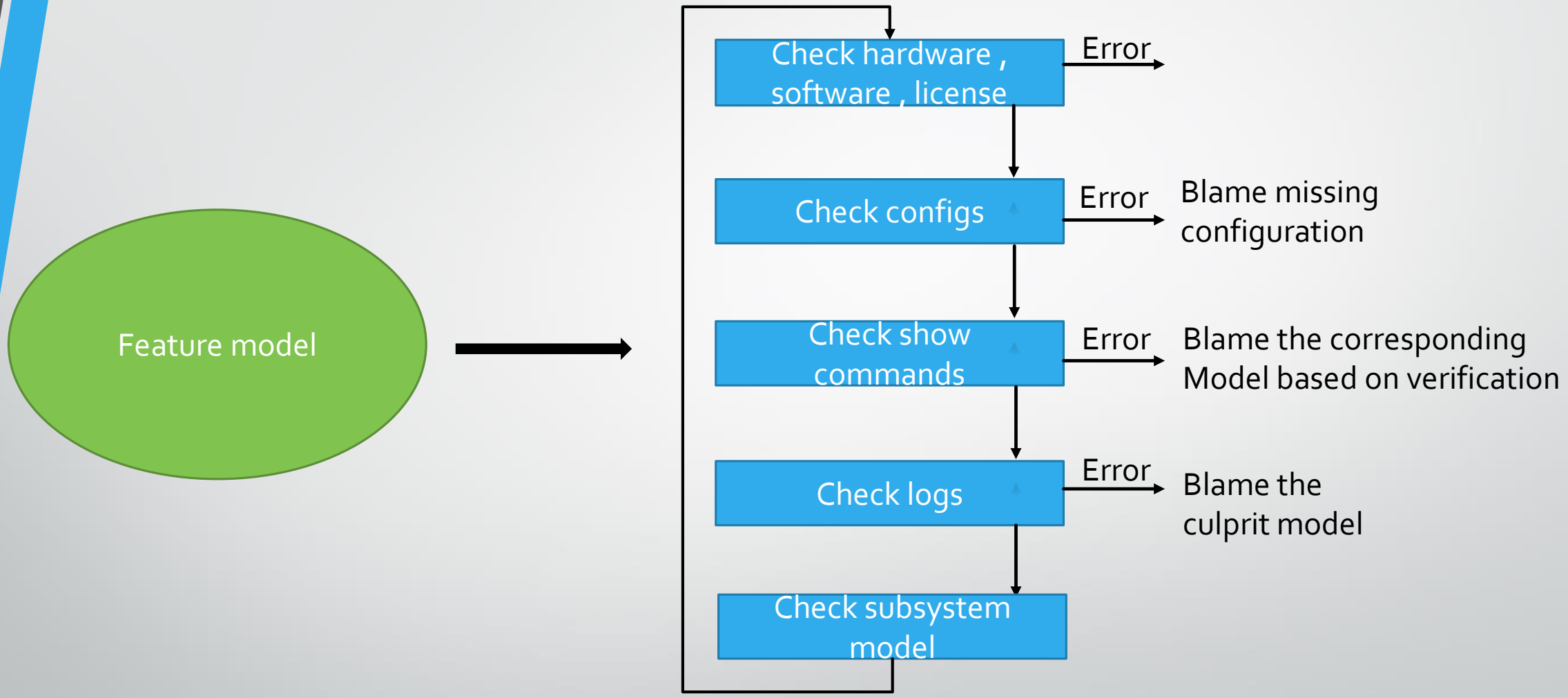
Enter the cli condition

no of schedulars > 40000 ,
blame efp-qos-egress

SUBMIT

```
feature qnode {
    requires {
        state {
            description “Find the number of qnodes used" ;
            cli "nile debug qnodes 0 0 4096";
                verify {
                no-of-schedulers < 40000;
                blame efp-qos-egress;
                }
        }
    }
}
```

Application



Apps on the top

User Configuration guide, tac toi, troubleshooting guide generator	*Collect all performance and scale numbers*	*Subsystem too complex to model? Rethink design? Break it down?*
auto-sync on doc change. Users rate models. Poor models are improved	*Collect all performance and scale numbers*	**Walk-through generation to explain how the entire device is working?**
Bug closed, behavior changed, cs-email query? Auto-update request sent to Engineer	*Machine learning on big data?*	*Model pipelines of how packet flows through system?*
Troubleshooter that understands the full system behavior and its components can be built	*Subsystem too complex to model? Rethink design? Break it down?*	***Anything you want!***

Demo

RSP2-Time#
RSP2-Time#
*May 4 05:23:42.333: %IOSXE_INFRA-4-NO_PUNT_KEEPALIVE: Keepalive not received for 50 seconds

punt-keepalive.model 1.97 KB

```
1  feature punt-keeplive {
2      requires {


logs {
    must-have {
    }
    not-have {
        "NO_PUNT_KEEPALIVE:  Keepalive not received for [number] seconds"
    }
}
```

---------- **Punt keepalive is not fine based on model** ----------

---------- check configuration for this feature ----------

```
22      config {
23          setPuntKeepAlive {
24              description "Settings for punt keepalive";
25              cli "platform punt-keepalive settings fatal-count $fatal-count
26              platform punt-keepalive settings warning-count $warning-count
27              platform punt-keepalive settings transmit-interval $transmit-interval
28              platform punt-keepalive disable-kernel-core
29              platform punt-policer queue 23 $max-punt-rate $max-burst-rate" ;
30          }
```

```
RSP2-Time#show run | s punt
no platform punt-keepalive disable-kernel-core
platform punt-keepalive settings transmit-interval 5
platform punt-keepalive settings fatal-count 60
platform punt-policer queue 1 10000 10000
platform punt-policer queue 23 10 10
RSP2-Time#
RSP2-Time## config looks good
```

---------- what subsystems does punt-keepalive depend on -------

```
21      subsystem npd, qnode,smand, nif,policer;
```

Start checking subsystems

RSP2-Time# # start monitoring npd stats to see if packet is reaching npd.

```
*May  4 05:28:17.856: %IOSXE_INFRA-4-NO_PUNT_KEEPALIVE:  Keepalive not received for 100 seconds
RSP2-Time#show platform hardware pp active infrastructure pi npd statistics summary | include KEEPALIVE
23   |        KEEPALIVE Q |                     19829 |                     0
RSP2-Time#show platform hardware pp active infrastructure pi npd statistics summary | include KEEPALIVE
23   |        KEEPALIVE Q |                     19829 |                     0
RSP2-Time#show platform hardware pp active infrastructure pi npd statistics summary | include KEEPALIVE
23   |        KEEPALIVE Q |                     19829 |                     0
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23   |        KEEPALIVE Q |                     19829 |                     0
RSP2-Time#show platform hardware pp active infrastructure pi npd statistics summary | include KEEPALIVE
23   |        KEEPALIVE Q |                     19829 |                     0
```

 # packets not reaching npd, npd not dropping

 # check subsystem smand

```
RSP2-Time#dir bootflash: | include puntinject_stats.log
  33  -rw-        1499315   May 4 2016 05:30:39 +00:00  puntinject_stats.log.1462245254
RSP2-Time#show clock
*05:30:43.233 UTC Wed May 4 2016  ---------- The file is recent ----------
RSP2-Time#
*May  4 05:30:51.872: %IOSXE_INFRA-4-NO_PUNT_KEEPALIVE:  Keepalive not received for 100 seconds
```

 # check what smand is doing

smand.model 417 Bytes — Edit | Raw | Blame

```
feature smand {
    requires {
        state {
            cli "show platform software shell renderer cache";
                verify {
                    max-count used;
                    blame screen-name;
                }
        }
        logs {
            not-have {
            "%PLATFORM-\d-ELEMENT_WARNING: R0/0: smand: SIP/\d: Committed Memory value \d% exceeds warning level \d%";
        }
    }
}
```

```
RSP2-Time#show platform software shell renderer cache
Shell Renderer Cache Entries
Used   Refs  Last Used  Last Modified     Screen Name
--------------------------------------------------------------------------------
4      0     02:08:29   04/29/16 06:33:59  show_diagnostic_cman_display.xsl
10     0     02:08:30   04/29/16 06:33:59  show_binos_bipc_managers.xsl
2      0     02:08:31   04/29/16 06:33:57  show_fman_rp_peers_display.xsl
2      0     02:08:29   04/29/16 06:33:55  show_mount_display.xsl
2      0     02:08:29   04/29/16 06:33:59  show_hwprg_display.xsl
2      0     02:08:31   04/29/16 06:34:00  show_binos_shell_manager_peers_brief.xsl
148    0     05:31:35   04/29/16 06:33:59  show_npd_stat_summ_xform.xsl
4      0     02:08:31   04/29/16 06:34:01  show_binos_process_environment.xsl
2      0     02:08:31   04/29/16 06:33:57  show_fman_fp_peers_display.xsl
7      1     23:20:59   04/29/16 06:34:00  show_shell_cache.xsl
2      0     02:08:30   04/29/16 06:33:55  show_filesystem_display.xsl
1      0     23:20:56   04/29/16 06:34:00  show_shell_cache_status.xsl
840    0     05:31:35   04/29/16 06:33:59  show_npd_tx_ring_xform.xsl <---------- large number of this command are executed
, smand is being asked to write punt-inject debug info to bootflash:
2      0     02:08:33   04/29/16 06:33:55  show_process_summary_display.xsl
4      0     02:08:30   04/29/16 06:33:59  show_cman_peers_display.xsl
2      0     02:08:30   04/29/16 06:33:59  show_aom_stats.xsl
2      0     02:08:40   04/29/16 06:33:58  show_vm_list_ver2.xsl
2      0     02:08:40   04/29/16 06:33:58  show_vman_global_ver2.xsl
210    0     05:31:35   04/29/16 06:33:59  show_npd_tx_intr_xform.xsl
28     0     05:31:35   04/29/16 06:33:59  show_npd_rx_ring_xform.xsl
```

 # check subsystem qnodes

The Number of scheduler nodes in que# 2177 is 105(69)
The Number of scheduler nodes in que# 2178 is 1(1)
The Number of scheduler nodes in que# 2185 is 107(6b)
The Number of scheduler nodes in que# 2186 is 3(3)
The Number of scheduler nodes in que# 2193 is 84(54)

Total Number of scheduler nodes are 39983(9c2f)

Total Number of stack scheduler nodes are 0(0)

qnode.model 489 Bytes

```
feature qnode {
    requires {
        state {
            description "If we have no free qnodes left, we cannot enqueue more packets.The maxi
            cli "nile debug qnodes 0 0 4096";
                verify {
                no-of-schedulers < 40000;
                blame efp-qos-egress;
                }
        }
    }
}
```

we know from model we have 40000 max qnodes, very few qnodes are available
blame statement tells us where to go from here
qnode model needs queue-limit if efp-egress-qos is configured
let's check efp-qos-egress model

```
RSP2-Time#
RSP2-Time#show run policy-map
Building configuration...
Current configuration : 371 bytes
!
policy-map SCALE_ASIC_QUEUES_MAX_SCOS_BASED
 class scos0
  shape average 1000000000
 class scos1
  shape average 55000
 class scos2
  shape average 60000
 class scos3
  shape average 65000
 class scos4
  shape average 70000
 class scos5
  shape average 80000
 class scos6
  shape average 85000
 class class-default
  shape average 90000
!
End
```

```
config {
        policy-map {
                policy-map $pmapName
                class $className
                shape average $shapeVal
                queue-limit $qlimit
        }
```

queue-limit configuration missing

is qos attached to efps

```
RSP2-Time#show policy-map int g0/4/1 ser in 1
 GigabitEthernet0/4/1: EFP 1
Service-policy output: SCALE_ASIC_QUEUES_MAX_SCOS_BASED
Class-map: scos0 (match-all)
     1431108 packets, 91590912 bytes
     5 minute offered rate 1180000 bps, drop rate 990000 bps
     Match: cos  0
     Queueing
     queue limit 393 us/ 49152 bytes
     (queue depth/total drops/no-buffer drops) 0/1226664/0
     (pkts output/bytes output) 204444/13084416
     shape (average) cir 1000000000, bc 4000000, be 4000000
     target shape rate 1000000000
Class-map: scos1 (match-all)
     1431108 packets, 91590912 bytes
     5 minute offered rate 1180000 bps, drop rate 1080000 bps
     Match: cos  1
     Queueing
     queue limit 7149381 us/ 49152 bytes
     (queue depth/total drops/no-buffer drops) 0/1333616/0
     (pkts output/bytes output) 97492/6239488
     shape (average) cir 55000, bc 60000, be 60000
     target shape rate 55000
Class-map: scos2 (match-all)
     1431108 packets, 91590912 bytes
     5 minute offered rate 1180000 bps, drop rate 1021000 bps
     Match: cos  2
     Queueing
     queue limit 6553600 us/ 49152 bytes
     (queue depth/total drops/no-buffer drops) 0/1266227/0
     (pkts output/bytes output) 164881/10552384
     shape (average) cir 60000, bc 60000, be 60000
     target shape rate 60000
```

```
RSP2-Time##      queue limit 4369066 us/ 49152 bytes
RSP2-Time#
RSP2-Time## blame configuration missing queue-limit
RSP2-Time#
```

Why adopt oneDoc ?

One extensible and readable template	*Model develops with iterations starting from developer to test to tac and cycle thereafter.*	*With change in design/implementation/ bug fix, only one doc needs to be updated*
One extensible and readable template	*Reduced time $$$$*	*Engineers can build on the same doc as new info comes*
User need not worry about format	*Debugging gets easy $$$$*	*Verification and maintenance is simplified $$$$*
Template will guide user to generate the model	*Clean, gives confidence to customers*	*Allows for tools to be built on top of standard* *More Innovation!!*

Challenges and future

- We have created the oneDoc app to create models based on inputs from the user
- Few models have been developed. The increase in quality and quantity of models will gradually happen when adaptation increases.
- The debugger application is currently ongoing .

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