

## Product paper

## Describing v. 2.0 "Keeper"

### Inside

#### About a device

Devices are the basis of a RMM tool. What types are supported? What can be done?

Page 2

#### Organizing devices

Managing one device is fun. Managing more is work. How to effectively organize many devices? How to get notified about problem and find the cause quickly?

Searching/filtering on customized view.

Page 3

#### Managing devices

Controlling device behavior. Managing firmware. Applying mass actions. Configuration profiles.

Page 4

#### Data: view+customize

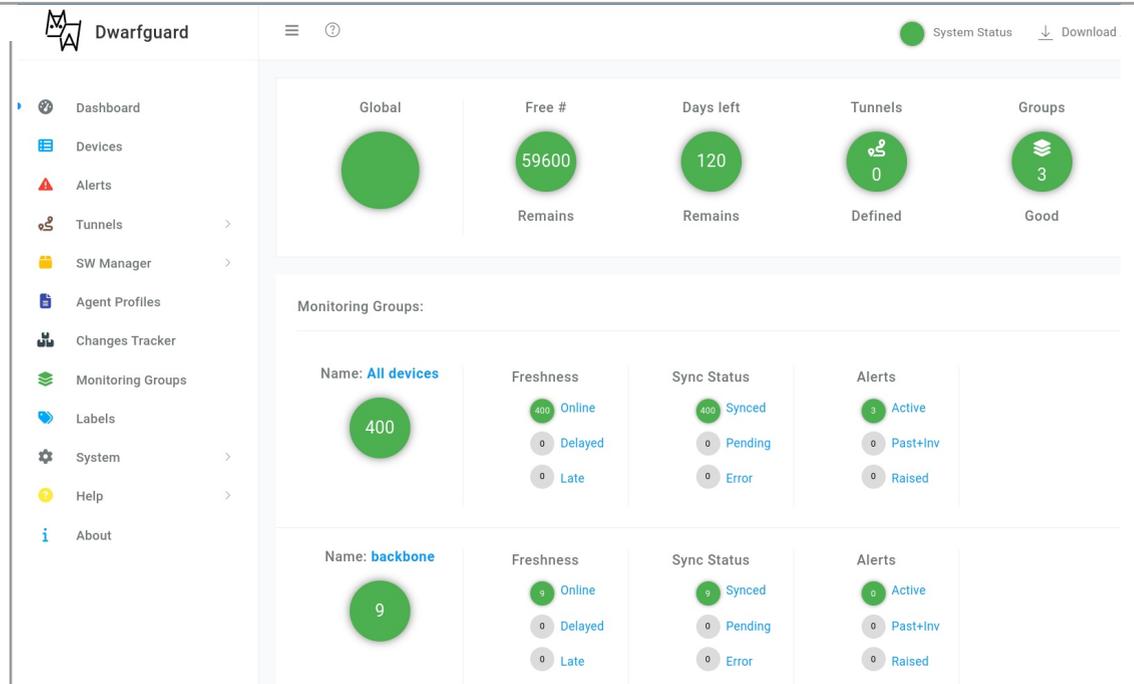
Analyzing devices data, changes, extremes. Providing custom data from devices supporting alerting, searching, filtering?

Page 5

#### Resources

On-premise requirements, resources links, performance. What makes DwarfGuard stand out?

Page 6



The Dashboard, showing system status and monitoring groups

## DwarfGuard is:

- Remote Monitoring and Management software
- High-performing on-premise/cloud solution
- RMM System supporting multiple device types:
  - Advantech Industrial cellular routers (ICR OS)
  - Teltonika industrial cellular routers (RUTOS)
  - CS-Tech gateways (CS-Tech Linux)
  - Linux servers and desktops
  - OpenWRT devices
- Addressing many common use-cases like:
  - Monitoring, visualizing and inspecting device data
  - Tracking changes, identifying extremes/deviations
  - Effective organization of devices
  - Devices firmware management
  - Custom Alerts definition, notification
  - Data export (FluxDB, Grafana)
  - Extensibility by custom scripts
- Open to custom development (new device types, features)
- Tested for up to 60000 devices
- Admin friendly - videos, bundled documentation



# About a device

## Device modes and types

- Agent-based: monitoring and management (supported device types)
- SNMP access: monitoring only
- Mass-install devices: Automated Agent Deployment



## Device details

Each device provides its metrics. Actual values are shown on Device Details

It contains among others:

- MEM, CPU load, # of running processes
- voltage, temperature, signal strength
- uptime, data age class, FW version
- network interface list
- access to FW flashing, labels, hostname

Device detail

Name: trout1  
SNMP Name: routx2  
Device ID: PGXS [Download preset agent](#)  
SN: 6205265  
Type: Advantech router  
Model: SPECTRE-v3-LTE  
OS: ICR OS  
Current OS/FW: 6.3.0 (NO specific)

Data Sync Status

Status: ● Synced  
Freshness: ● 0 missed contacts  
Data age: <5 minutes

Firmware version: 6.3.0 [Set version](#)

Agent Profile: DEFAULT [Set](#)

Auth Profile: Factory default [Set](#)

Config Profile: - No Config profile - [Set](#)

Monitoring Groups: [Select Monitoring groups](#) [Set](#)

[backhome](#) [critical](#)

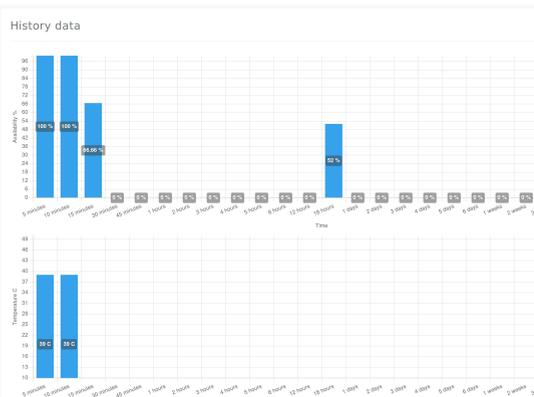
Statistics

Uptime: 4 days, 17:25:38  
Memory Total: 498.02 MB  
Memory Available: 470.76 MB  
Running Processes: 52  
Root Disk Space Available: 46.41 MB  
Load Average 1 minute: 0.63  
Load Average 5 minute: 0.22  
Load Average 15 minute: 0.08  
Last Reboot: 03.04.2026 15:04:59  
Reboot Counter: 1 times  
Voltage: 11.9 V  
Temperature: 39 °C  
Signal strength: -94 dBm  
Signal quality: -6 dB  
Signal CSQ: N/A  
Signal RSSI: N/A

Notes

Note1: None  
Note2: None  
Note3: None

List of Packages



## History data

Shows aggregated statistics for:

- Availability, temperature, memory
- In/Out traffic
- Signal strength, reboot counter

# Organizing devices

## Monitoring groups

- Device can be in multiple Monitoring Groups
- Custom alerts per group (or device)
- All groups present on Dashboard, showing status and clickable breakdown
- Automatic system group "All devices" for alerts over all devices

Name: <b>All devices</b> 121	Freshness 121 Online 0 Delayed 0 Late	Sync Status 121 Synced 0 Pending 0 Error	Alerts 4 Active 1 Past+Inv 2 Raised
Name: <b>backbone</b> 9	Freshness 9 Online 0 Delayed 0 Late	Sync Status 9 Synced 0 Pending 0 Error	Alerts 1 Active 0 Past+Inv 0 Raised
Name: <b>critical</b> 15	Freshness 15 Online 0 Delayed 0 Late	Sync Status 15 Synced 0 Pending 0 Error	Alerts 2 Active 0 Past+Inv 0 Raised

Global  
  
Groups

Free #  
60379  
Remains

Days left  
183  
Remains

Tunnels  
0  
Defined

Groups  
1  
Bad

**Warnings:**  
Some groups have late devices, synchronization errors or triggered alerts. See red groups below.

Monitoring Groups:

Name: **All devices**  
121

Freshness  
121 Online  
0 Delayed  
0 Late

Sync Status  
121 Synced  
0 Pending  
0 Error

Alerts  
4 Active  
1 Past+Inv  
2 Raised

**Triggered Alerts:**

- Device too hot** for monitoring group: All devices for devices: List All ( AFDA , ASBV , OGAG , RZUZ , SARP , SPZD , TAGS , TTZZ , XABU , XXDT )
- Device with no/low rootFS space** for monitoring group: All devices for devices: List All ( AUOC , FVRD , GDFD , OPOF , PVBD , RCGO , SPVP , TRTD , UTVR , VTPO , XZSO , ZBRB )

**Past Alerts:**

- Critical device late** for monitoring group: All devices for devices: List All ( CAFR , OTZZ , RZZG , SPZD , VBT , XVPR ) (Clear counter)

## Root-cause identification

- Group alerts defined like:
  - Alert when at least X devs in group Y match condition
- Easy and fast ID of problem - Dashboard
  - affected group changes color
  - direct link to devices triggering alert
- Past alerts to review
- Notifications on e-mail and slack



## Devices table

- devices overview
  - customizable columns
- supports text search
  - name, note, DevID
- supports filter
  - on any selectable column
  - type, group, label, ...
- supports sorting on any numeric metric
- allows downloading CSV
- offers mass actions

Registered Devices 17

[Export](#) [Refresh](#) Search:

Showing 1 to 6 of 6 entries (filtered from 121 total entries)

DevID	Name	Type	Model	OS	Version	Monitoring Groups	Freshness	Actions
AZGX	Columbus A2	Advantech router	LR77-v2	ICR OS	6.3.6	All devices Backbone Critical	0 missed contacts	<a href="#">Detail</a>
AZYC	Columbus A3	Advantech router	SPECTRE-v3-LTE	ICR OS	6.3.6	All devices Backbone Critical	0 missed contacts	<a href="#">Detail</a>
DZYR	Honolulu	Advantech router	SPECTRE-v3-LTE-US	ICR OS	6.3.9	All devices	0 missed contacts	<a href="#">Detail</a>
GDFD	luminous	CS-Tech gateway	CSG-3xx	CS-Tech Linux	1.0.0	All devices Critical	0 missed contacts	<a href="#">Detail</a>
UFAT	blue1	Teltonika router	RUTX50	RutOS	00.07.06.3	All devices Backbone	0 missed contacts	<a href="#">Detail</a>
UFVD	blue2	Teltonika router	RUT955	RutOS	00.06.09.4	All devices Backbone	0 missed contacts	<a href="#">Detail</a>

50 entries per page

# Managing devices

## Agent Profile List

+ Create Agent Profile Refresh

Showing 1 to 5 of 5 entries

Id	Name	Ping	Regular	Debug	Fallback	Small Cycles	Fall Tolerance	Devices count	Actions
1	DEFAULT	10	260	10	60	5	5	121	Edit
2	FASTEST	4	60	4	60	1	0	0	Edit
3	SLOWEST	600	86400	3600	600	100	100	0	Edit
4	Cellular data slow	300	900	10	60	3	20	0	Edit Delete
5	Manuf machine connected	10	300	10	60	5	5	0	Edit Delete

## Agent Profiles

- To control how often does a device sends data to the server.
- New profiles can be added.
- Profiles can be mass-assigned and profile definition is customizable.

## Firmware Management

- Automatic/manual FW download
- Approve versions you want to distribute
- Assign individually or use mass action
- Keeps device on desired version
- For Advantech, Teltonika, CS-Tech

### List of files for firmware ICR OS v6.3.6

Upload new firmware

Name	Size	Created
ER75i-v2.bin	12,468,332	2026-04-09 22:47:58
ICR-445x.bin	17,335,630	2026-04-09 22:47:58
BVIAS-v2HC.bin	12,495,763	2026-04-09 22:47:58
SPECTRE-v3-ERT.bin	15,987,120	2026-04-09 22:47:58
URS1-v2L.bin	12,450,248	2026-04-09 22:47:58
SPECTRE-v3F-LTE.bin	16,092,577	2026-04-09 22:47:58

### List of OS and firmware versions

+ Add Firmware Refresh

Showing 1 to 12 of 12 entries

Id	Os Type	Version	Available	Approved	Devices count	Actions
1	ICR OS	6.2.0	Yes	No	0	Details
2	ICR OS	6.5.2	Yes	No	0	Details
3	ICR OS	6.5.3	Yes	No	0	Details
4	ICR OS	6.3.0	Yes	No	2	Details
5	ICR OS	6.3.9	Yes	No	61	Details
6	ICR OS	6.3.6	Yes	No	3	Details
7	RuTOS	00.07.13.1	No	No	1	Details
8	RuTOS	00.07.06.3	No	No	1	Details
9	RuTOS	00.06.09.4	No	No	22	Details
10	RuTOS	00.06.09.2	No	No	1	Details
11	RuTOS	00.07.12.2	No	No	18	Details
12	CS-Tech Linux	1.0.0	No	No	10	Details

## Registered Devices

Export Refresh

Showing 1 to 3 of 3 entries (filtered from 121 total entries)

Device	Name	Type	Model	OS	Version	Monitoring Groups	Freshness	Actions
UFAT	blue1	Teltonika router	RUTX50	RuTOS	00.07.06.3	All devices	9 missed contacts	Details
UFVD	blue2	Teltonika router	RUT955	RuTOS	00.06.09.4	All devices	9 missed contacts	Details
ZGRC	None	Teltonika router	RUT200	RuTOS	00.07.13.1	All devices	9 missed contacts	Details

## Mass actions

- Available on Devices table
- Use with selection/filters
- Assign/remove group/label/config
- Switch FW version, agent profile

Add to Monitoring group
Assign Custom Labels
Assign System Labels
Assign Config Profile
Assign Fw Version
Assign Agent Profile

Remove Monitoring Group
Remove Custom Label
Remove System Label
Remove Config Profile

## Advantech specific

- SMS commands
- Configuration profiles
- Mass-manage device configuration
- Editable in XLS, download, upload

Template

Select a Template

- Select a Template
- Arbitrary SMS
- Switch to SIM1
- Switch to SIM2
- Switch router to online
- Switch router to offline
- Set binary output to 0
- Set binary output to 1
- Set 2nd binary output to 0
- Set 2nd binary output to 1
- Switch to standard CFG profile
- Switch to alt1 CFG profile
- Switch to alt2 CFG profile
- Switch to alt3 CFG profile
- Reboot the device

## List of Config Profiles

Create From Device Create From existing Profile Upload new Profile Refresh

Showing 1 to 2 of 2 entries

Id	Label	Devices count	Actions
89	Factory_wifi	0	Manage Assigned devices Delete
		0	Manage Assigned devices Delete

Configuration Profile detail

Existing Config Profile

#	Key	Value
1	ETH_DHCP_POOL_ENABLED	0
2	ETH_GATEWAY	172.17.0.1
3	ETH_IPADDR	172.17.2.123
4	ETH_NETMASK	255.255.248.0
5	ETH_NETWORK	172.17.0.0
6	ETH_PRIMARY_DNS	172.17.0.1
7	NAT_MASQUERADE	0
8	NAT_REMOTE_HTTPS	1
9	NAT_REMOTE_SNMP	1
10	NAT_REMOTE_SSH	1
11	PPP_ENABLED	0

Uploaded Config Profile

#	Key	Value
1	ETH_DHCP_POOL_ENABLED	0
2	ETH_GATEWAY	172.17.0.1
3	NAT_MASQUERADE	1
4	NAT_REMOTE_HTTPS	1
5	NAT_REMOTE_SNMP	1
6	NAT_REMOTE_SSH	0
7	PPP_ENABLED	0
8	MOD_adaufg_ENABLED	1
9	PROFILE	
10	IPSEC2_DOWN	

# Data - analyze, customize

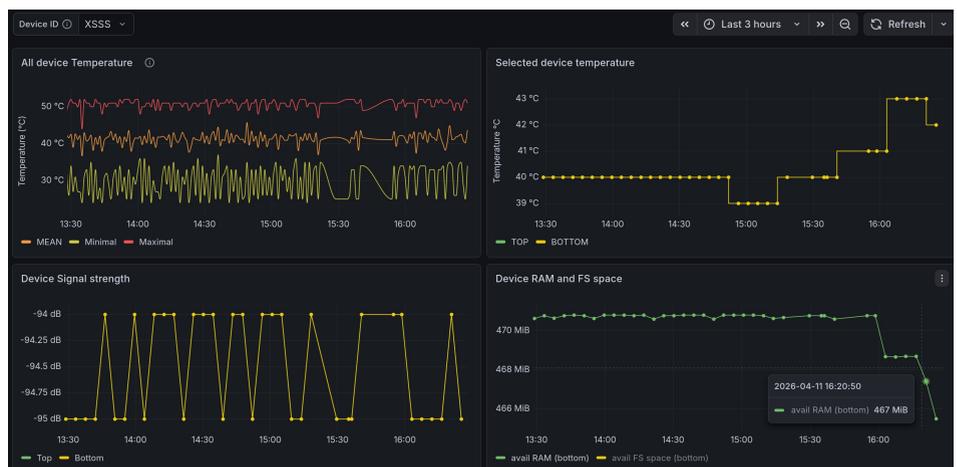
ID	Metric	Device Id	Device Name	Value	Created
3	Temperature	YZ5X	gateway	40	03.03.2023, 09:23:51
9	Temperature	RZVV	r4 - flex	39	03.03.2023, 09:24:10
14	Temperature	PVOD	clonedest	37	03.03.2023, 09:24:35
36	Temperature	PBXC	r3 - flex	37	03.03.2023, 09:48:16
46	Temperature	PBXC	r3 - flex	37	03.03.2023, 10:40:45
50	Temperature	PBXC	r3 - flex	37	03.03.2023, 12:13:02
52	Temperature	PBXC	r3 - flex	37	03.03.2023, 12:21:26
19	Temperature	DVCB	r2 - start	36	03.03.2023, 09:25:44
32	Temperature	PBXC	r3 - flex	36	03.03.2023, 09:35:09

## Changes Tracker

- allows searching for peaks/depths
  - e.g. highest reported temperature
- allow comparison on additional metrics
  - e.g. device with highest reboot counter
- helps finding date of value change
  - e.g. show changes for Firmware version
- offers limiting time span of the inspection

## DCL (Data Change Log) - Stream, DB and file export

- DCL export types have separate configuration
- Stream export goes into FluxDB
  - Consumed by Grafana if enabled
- DB export into main SQL DB
  - Consumed by Changes Tracker
- File export possible
- Example Grafana dashboards provided



## Custom scripts

- Execute bash scripts on devices
- Map on agent profiles and device types
- Output (numbers, strings) sent to server
- View/search/filter in dev. table + alertable

Device type

- Advantech router
- OpenWRT box
- Teltonika router
- CS-Tech gateway
- CMMD device

Agent profile

- FASTEST
- SLOWEST
- Cellular data slow
- Manuf machine connected

[Add Custom script](#)

## List of Custom scripts

[+ Add Custom Script](#) [Refresh](#)

Showing 1 to 3 of 3 entries

ID	Description	Device Types	Agent Profiles
1	Test script	Any	Any
2	Manuf machine measurement	Linux box, Advantech router, CS-Tech gateway	Manuf machine connected
3	CS random test	Linux box, CS-Tech gateway	Cellular data slow

50 entries per page

# Doc, resources and server

- Help
- Compendium
- Overview
- Dashboard
- Devices
- Device Configuration
- Agents
- Firmware
- Config Profiles
- Agent Profiles
- Sw Packages
- Changes Tracker
- Monitoring Groups
- Alerts
- Labels
- Tunnels
- Auth Management
- Custom Script Management
- Snmp Gateway

## Dwarfguard Resources compendium

Below is a list of various frequently visited topics and links to other resources concerning effective use of Dwarfguard.

If you are looking for the Dwarfguard introduction to guide you during first steps of setting up:

### How to ... bundled documentation

- Setup slack/e-mail notification
- Connect device to Dwarfguard
- Define an alert
- Do basic devices operations - details, naming, searching
- Use Agent Profiles to specify frequency of device to server updates.
- Update device OS/Firmware
- Access a device via web tunnel
- Send (configuration) SMS to a device or arbitrary number.
- Compute amounts of data transferred over a group of devices over a time period.
- Manage your SIM cards.
- Configure device and mass configuration.

### How to ... online video links

- Dwarfguard showcase video - a tour showing some of what Dwarfguard can do
- How to add device (of any supported type) to Dwarfguard
- How to effectively organize your devices
- How to use, manage and define alerts
- Changes Tracker usage
- Using Agent Profiles
- How to use Automatic Agent Deployment tool
- Flashing device firmware and FW management (ICR OS for Advantech cellular routers)
- What is Tunnel good for and how to use it?
- How to exchange Dwarfguard license
- How to use Configuration profiles (for Advantech cellular routers)
- How to setup notifications

## Information resources

- In-app help
  - available all the time
  - covers all main topics/howtos
  - further pointers
- Video Guides - DT Youtube ch.
- Administrator's Notes (for On-Prem, Cloud)
- Troubleshooting

## Server install

- Debian Linux 13 or 12 Server / VM / Linux container
- On premise HW req. - see performance
  - depends on number of devices
  - RAM 512 MiB min, storage 2 GiB min
- Can run without Internet connectivity
- Server commandline integration
  - dwarfg\_<cmd> commands

## Performance tests

- Every Major version
  - Stability + perf test
  - Test protocol available
- v1.0.0
  - stability test 30k devices
  - test results for 30k devices:
    - Intel Core-i5 4core 1.7GHz 32G RAM
    - CPU 1core load: 63% (16% 4core)
    - RAM used: 1.5 %
- v2.0.0
  - pending (released 2026-04)

## Competitive advantages

- Supports multiple device types
  - No HW-vendor lock
  - Additional device types on request
- Custom development possible
- Made by experts with domain knowledge
- Quality, stability, performance
- We take care of our product
  - Proven track of patch releases
  - 0.7.x, 0.8.x, 1.0.x
- No-EOL guarantee with any support level
  - Free license upgrade when last allowed version becomes EOL

## Longterm compare - since v0.6

	RAM - RSS MiB	% of previous	KiB per device	% of previous	Pushes/sec	% of previous
0.6.0	C1	49	100	15	100	142
	C2	54	100	7	100	182
	C3	112	100	8	100	189
	C4					
0.7.0 - introduced DCL	H1	61	100	8	100	193
	C1	57	116	20	133	143
	C2	95	176	19	271	175
	C3	271	242	23	288	161
0.8.0	C4	665	100	21	100	190
	H1	491	80	15	188	155
	C1	57	100	13	65	126
	C2	75	79	10	53	237
1.0.0 - introduced varied data in emulator	C3	186	69	14	61	284
	C4	415	62	12	57	324
	H1	395	80	12	80	237
	H0	88	100	13	100	97
	H1	408	103	12	100	250

		Stability tests						
ID / Environment		Stab-2-2 / C1	Stab-4-2 / C2	Stab-8-2 C3	Stab-16-2 C4	Stab-16-2 H1	Stab-4-48 H0	
Test specs	Devices	1000	3000	10000	30000	30000	3000	
	Emulator threads	2	4	8	16	16	4	
	Set: Time / minutes	120	120	120	120	120	2880	
	Set loop time / sec	200	200	200	200	200	200	
HW specs	CPU cores	1	2	4	8	8	2	
	RAM / MiB	512	1024	2048	4096	32768	16384	
Resources	Pre-test	Available MiB OS	296.00	783.00	1800.00	3800.00	30000.00	14000.00
	Used MiB OS	215	240	226	217	608	790	
	dwarfgd RSS (MiB)	44	44	44	44	49	49	
	Post-test	Available MiB OS	265	687	1400	2700	29000	14000
	Used MiB OS	246	336	617	1300	1800	883	
	mamasd RSS (MiB)	57	75	186	415	395	88	
	avg load 15	0.07	0.16	0.51	1.18	0.78	0.27	
	avg load 15 / cpu core	0.07	0.08	0.13	0.15	0.10	0.14	
Results	Test numbers	Processed loops	34	33	32	31	31	769
		Total time	7302	7308	7260	7353	7427	173013
		Real Loop time/sec (1)	215	221	227	237	240	225
		Estimated data-pushes	36000	108000	360000	1080000	1080000	2592000
	Errors	Performed Pushes	34000	99000	320000	930000	930000	2307000
		Estim. Avg regs/sec	5.00	15.00	50.00	150.00	150.00	15.00
		Rough avg regs/sec (*)	4.66	13.55	44.08	126.48	125.22	13.33
		Data ERR/retries	0	0	0	0	31	0
	Calculations	Crashes	0	0	0	0	0	0
		Reboots	0	0	0	0	0	0
		Log entries	2	0	1	1	0	1
		Log analysis	CFG profile sync	None	Mid-air profile collision	Mid-air profile collision	1 Invalid ID	Mid-air profile collision
Summary	RSS increase MiB	13	31	142	371	346	39	
	RSS increase %	29.55	70.45	322.73	843.18	706.12	79.59	
	MiB per device	0.013	0.010	0.014	0.012	0.012	0.013	
	RAM utilization %	48.05	32.81	11.04	5.30	1.86	4.82	
Verdict	Max safe # of devs	2081	9143	90619	566267	1616842	62218	
	RAM utilization note	reasonable	ok	perfect (low)	perfect (low)	perfect (low)	perfect (low)	
	CPU utilization note	perfect (low)	perfect (low)	perfect (low)	perfect (low)	perfect (low)	perfect (low)	
		PASSED	PASSED	PASSED	PASSED	PASSED	PASSED	