

Troubleshooting the Antelope Real-time System

METHODS AND TOOLS THAT HELP YOU RUN ANTELOPE 24/7/365

Stefan Radman, Kinematics

AUG 2018, Ljubljana

Real-time monitoring

rtm, dlmon, orbrtd et al

The screenshot displays the RAN Data Processing software interface, which is divided into several functional areas:

- System Status (Antelope 5.7):** Shows system health with a 'Start' button and 'System is up' status. It includes load averages (1min: 4.76, 5min: 4.75, 15min: 4.89), CPU usage (16 cpus), memory usage (ram: 64259 Mb, swap: 4092 Mb), and disk usage for root, waveforms, and tmp.
- Processing Tasks:** A table listing various tasks and their resource usage.

Task	Pid	cpu	rss	To Orb	From Orb
rtexec	2972	0.00	6.8	10000	
orbserver	5225	13.80	5058.5	10000	
RANacq	7709	2.40	2.7	10000	321.3 Kbps
SYSCOMacq	10098	0.00	2.5	10000	1.5 Kbps
UNITSacq	12369	0.40	2.7	10000	49.4 Kbps
CESlacq	14665	0.00	7.1	10000	0.0 bps
ISNETacq					
orbdetect	16730	3.90	119.8	10000	409.6 bps
orbassoc	16830	0.30	1755.2	10000	0.0 bps
magnitudes	16961	0.30	134.2	10000	0.0 bps
orbwfmeas	17042	0.20	24.1	10000	0.0 bps
TriggerOrigin	23222	1.50	8.5	10000	
orb2wf	17601	8.60	94.2	10000	372.2 Kbps
- Waveform Viewer (orbrtd):** Displays multiple channels of data waveforms in yellow on a dark blue background. The channels are labeled with station names and codes (e.g., MM_HKA HHZ, MM_KTN HHZ, MM_YGN HHZ).
- Monitoring Table (dlmon):** A detailed table showing monitoring parameters for various stations.

dlname	gp24	gp1	nr24	SLT	dltncty	runtm	tp	cme	bufr	nl24	np24	ni24	dr	br24	bw24	meme	ade	cals	cltncty	lcq	cldrf	m0-2	m3-5	temp	volt	amp	aamp	gps	gps	pll	lat	lon	elev
MM_HKA	0s	0s	0	00s	03s	14h43m44s	1.00	100%	0.0%	2	0	0	9.1k	91m	6.7m	0			00s	100%	0us	20	9	28C	12.2V	70mA	4mA	3D	L	22.642	93.599	1703m	
MM_KTN	0s	0s	0	00s	03s	07h26m41s	1.00	100%	0.0%	1	0	0	12k	112m	6.8m	0			00s	100%	-2us	20	15	32C	12.2V	72mA	4mA	3D	L	21.286	99.590	814m	
MM_MDY	10d	10d	1	00s	03s	57m04s	1.00	100%	0.0%	1	0	0	8.3k	3.4m	310k	0			00s	100%	1us	20	25	33C	12.2V	68mA	4mA	3D	L	22.016	96.112	69m	
MM_SIM	0s	0s	0	00s	03s	31d00h01m55s	31d00h01m16s	0.00		0	0	0	0	0k	48k																		
MM_TMU	0s	0s	0	00s	03s	20h58m17s	1.00	100%	0.0%	1	0	0	9.8k	86m	6.7m	0			00s	100%	0us	20	19	36C	12.3V	70mA	4mA	3D	L	24.229	94.300	147m	
MM_YGN	0s	0s	0	00s	03s	21h31m53s	1.00	100%	0.0%	1	0	0	12k	121m	7.0m	0			00s	100%	-2us	20	9	33C	11.8V	74mA	4mA	3D	L	16.865	96.153	-9m	
- Timeline (dlmon):** A horizontal timeline at the bottom showing data acquisition periods for stations like CU_MTBJ and CU_SDDR, with time markers from 2018125:23:00:00 to 2018126:03:00:00.

Talking points

Summary

3

- Monitoring data availability and state of health
- Reporting problems and reading logs
- Incident and bug reports

Monitoring data availability and state of health

Report on Real-time system status and data return

4

- **rtsys** = System Report
- **rtreport** = Data Report
- Not enabled by default
(remove hashmarks)

```
smr — -bash — 80x24
[smr:~ smr$ cat /opt/antelope/5.7/data/pf/rtexec.pf | fgrep -A10 crontab
crontab &Arr{
# These cron jobs are actually run by rtexec.
# Their environment is the same as the rtexec environment.
# stdout and stderr are redirected to logs/name.
#
# task      UTC/LOCAL Min Hr Day Month DayOfWeek  Command
# report on rt system status and data return
## sysreport  UTC      0  3  *  *  *      rtsys -m rt@localhost -p
## datareport UTC     30  3  *  *  *      rtreport -z -m rt@localhost

smr:~ smr$ █
```

```
# report on rt system status and data return
## sysreport  UTC      0  3  *  *  *      rtsys -m rt@localhost -p
## datareport UTC     30  3  *  *  *      rtreport -z -m rt@localhost
```


rtreport

Useful statistics on network performance

5

- Run as daily cronjob
- By default reports on the past calendar day
- Only reports on stations that are active in your dbmaster!
- Use flag “-N” to restrict report to your own network
- Restrict further by using the “-s” (subset) flag e.g.
-s 'sta!~/MDY/'

```
smr — less ◀ man rtreport — 80x23
RTREPORT(1)                                User Commands                                RTREPORT(1)
NAME
    rtreport - report some useful statistics on network performance
SYNOPSIS
    rtreport [-d start-time]
              [-m email,..]
              [-N net]
              [-n days]
              [-p pf]
              [-s subset]
              [-x deployment-subset]
              [-w waveform-db]
              [-gvYz] [directory]
DESCRIPTION
    rtreport summarizes the data flow in a running real time system, using
    primarily the data from the database. It must be run either from the
    directory where rtextec.pf resides, or with a command line argument
    specifying that directory.
:
```

- Report period
- Subset
- Data volume collected
- Issues

```
Data report for 1 days beginning Tuesday April 24 2018-114

Report for subset:
  sta =~
/0CANIACQIALDIAMEIAMTASPIAULI AVLIBC NIBGRIBLLIBNEIBNOIBRSAIBVTICARCICCTICERICHI
CHIEICLNICMBICMEICMLICNOICONICOPICRIICRPICSMICSANICSNICSO1ICSSICUNICVLICVMIDA
NTIDSGIDST2IDURIFAZIFDFIFDSIFIEIFOCIFOPCIGEAIGEPFIGNLIGNUIGNVIGORIIINVIIISIILECILG
NILNTILSPILSSILTAIMCSIMLFIMMP1IMNGIMOGGIMONFIMSAIMTCLIMTFTIMVOIMZZINAPIORPIPAL
AIPALMIPANIPLRIPNALIPOLCIPPL1IPSCRIPTCIPURAI PVFIRCUI RDGIRGSIRMMMIRMVTISAGISARIS
COISDNISGMAISGPAISGSCISGVISLC1ISLDISM RISNMISNS1ISONISPDISPPISRCISSOISTFISULISU
LAISULCISULPISVAITARVITLSITNOITODITORITPAITPIITREITRN1IUMBTIVALSI VDBIVNF1IVNMIVRB/
  && chan =~ /H[GLN][ENZ]/

Showing z channels only

Collected 6.663 Gbytes of data
  filesystem has 137.8 Gbytes left: about 20.7 similar days

Problem #1
  Log files are rather large: 1086.71 mbytes
```


rtreport

Data availability report

- Data recovered
- Data missing
- Data return per network
- Stations without data

94.02% data recovered from all selected channels
122 of 129 stations reporting.

missing average of 1:26 hours of data from 131 channels

Performance by network

Net %Return	Network	Stations	Channels
HA 91.40%	HAREIA Network	3	3
IT 96.57%	Italian Strong Motion Network (RAN)	116	118
NI 25.00%	North East Italy Broadband Network	4	4
RF 91.00%	Friuli Venezia Giulia Accelerometric Network	6	6

7 stations appear to be down:

- NI DST2 DST-Trieste_station
- IT FDF Filadelfia
- IT ORP Orsara_di_Puglia
- NI PALA Monte_Pala
- IT PAN Panicale
- NI PURA Passo_Pura
- IT SAG Sant_Angelo_dei_Lombardi

- Common gap caused by common communication issue (VPN)

Detailed Waveform Gaps from 4/24/2018 for 1 days

HA 91.40% HAREIA Network 3 stations 3 channels

CHIE Chievolis HAREIA
HNZ 2:04 hours
05:49:53.000 31.000 seconds
05:53:12.000 2:02 hours
17:25:42.000 55.000 seconds

INVI Invillino HAREIA
HNZ 2:04 hours
05:49:53.000 31.000 seconds
05:53:12.000 2:02 hours
17:25:42.000 55.000 seconds

TARV Tarvisio HAREIA
HNZ 2:04 hours
05:49:53.000 31.000 seconds
05:51:44.000 31.000 seconds
05:52:58.000 2:02 hours
17:25:42.000 55.000 seconds

- On-site Maintenance
- Digitizer reboot
- Power outage
- Powered from twilight switch but battery too small

IT 96.57% Italian Strong Motion Network (RAN) 116 stations 118 channels

CHF Chiusaforte
HGZ 22:47 minutes
12:37:37.000 22:46 minutes
13:01:42.870 890.000 milliseconds

DSG Desenzano_del_Garda
HGZ 15:43 minutes
09:57:29.000 15:43 minutes

FDF Filadelfia
HGZ 1 days
00:00:00.000 1 days

MTFT Montefortino
HGZ 11:08 minutes
09:37:44.000 11:00 minutes
09:48:59.815 2.000 seconds
09:49:02.400 600.000 milliseconds
09:49:04.500 500.000 milliseconds
09:49:20.615 1.200 seconds
09:49:22.815 1.000 seconds

The screenshot shows a terminal window with a title bar containing window control buttons (red, yellow, green) and navigation icons (back, forward, search, print, flag). The content of the terminal is as follows:

Event Information
Total detections: 19185
Total triggers : 0
Total origins : 37
Total events : 9

Evid #397795 : CENTRAL ITALY

Orid	Author	Mb	MI	Time	Latitude	Longitude	Depth
397804	INGV		2.30	2:24:19.350	43.0238	13.0148	8.6000
397795	oa_IMI		2.31	2:24:19.775	43.0307	12.9817	10.0000
397796	oa_IDbgMI		2.38	2:24:20.129	43.0094	13.0195	4.7912

Evid #397797 : CENTRAL ITALY

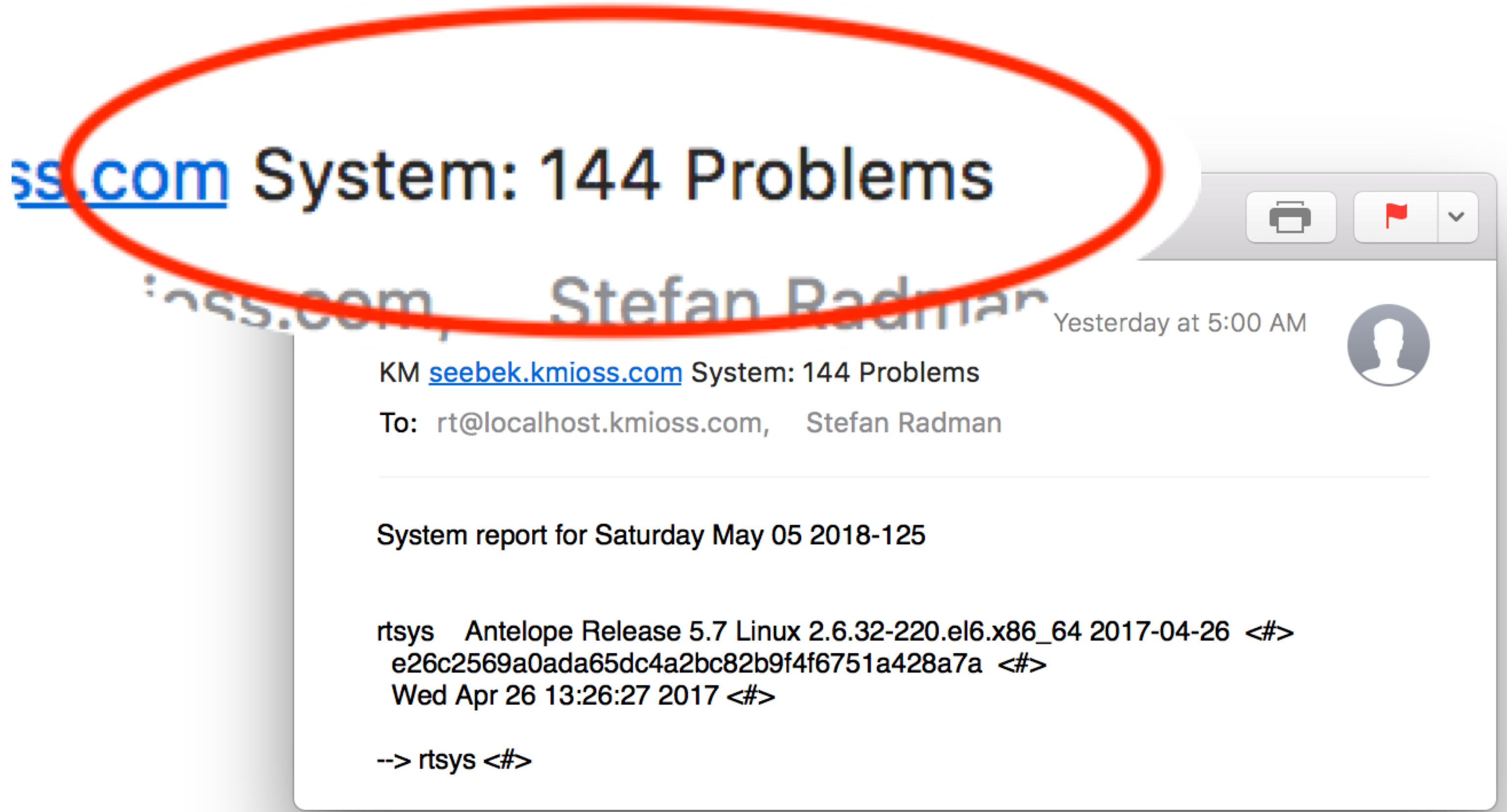
Orid	Author	Mb	MI	Time	Latitude	Longitude	Depth
397801	INGV		2.20	3:22:55.540	43.0443	13.0503	8.9000
397799	oa_IMI		2.33	3:22:56.317	43.0750	13.0431	5.0000
397797	oa_IMI		2.31	3:22:56.402	43.0750	13.0431	5.0000
397798	oa_IDbgMI		2.51	3:22:56.549	43.0423	13.0573	1.0867
397800	oa_IDbgMI		2.37	3:22:56.579	43.0462	13.0541	1.4363

Evid #397841 : CENTRAL ITALY

Orid	Author	Mb	MI	Time	Latitude	Longitude	Depth
397843	oa_IMI		2.74	14:57:06.226	43.0307	12.9817	10.0000
397841	oa_IMI		2.74	14:57:06.248	43.0307	12.9817	10.0000

- Summarize log reports
- Does a pretty good job
- Sends email
- # Problems in Subject
- Needs help sometimes
- Configure via pf

```
smr — less ◀ man rtsys — 80x24
RTSYS(1) RTSYS(1)
NAME
    rtsys - summarize log reports
SYNOPSIS
    rtsys [-CDpV]
          [-d time]
          [-m email,...]
          [-P pf]
          [-p]
          [-N net]
          [-n nlines]
          [-w waveform-db]
          [directory]
DESCRIPTION
    The real time system generates many different log files, which can be
    tedious to peruse regularly. rtsys summarizes the potentially crucial
    information in these log files; this report can then be more easily
    screened for problems.
OPTIONS
:█
```



System: 0 Problems

Antelope Real-time
IT ranalfa.localdomain System: 0 Problems
To: cesi@localhost.localdomain, ranalert1@protezionecivile.it

System report for Wednesday November 15 2017-319

rtsys Antelope Release 5.6 Linux 2.6.32-220.el6.x86_64 2016-04-29 <#>
7881ced274625ea215b7505cdb15c3e96f36652 <#>
Wed Apr 26 22:29:17 2017 <#>

--> rtsys <#>

Rete Accelerometrica Italiana
ranalfa:/aspen/cesi_aspen/rtsystemCESI database=db/cesi orb=:cesi (30712)
2017-320 03:00:00 epochnotify: Fri Apr 29 19:33:47 2016 <#>

Current time:
11/16/2017 (320) 3:00:00.000 UTC
11/16/2017 (320) 4:00:00.000 Standard Time

No System shutdowns since midnight 11/15/2017 UTC
no shutdowns ever recorded.

No processes restarted since midnight 11/15/2017 UTC

Excessive Log file lines	
apy2orb	136430
edax2orb	14005
cron-datareport	163
cron-rtdbclean	54
cron-cleanlogs	17

0 problems noted

No System shutdowns

No processes restarted

Excessive Log file lines

apy2orb	136430
edax2orb	14005

By the way

Before I forget...

14

- Keep your logfiles short
- Enable the `cleanlogs` task in `crontab`
- It is not enabled by default

Excessive Log file lines

<code>apy2orb</code>	136430
<code>edax2orb</code>	14005

```
smr — -bash — 80x5
[smr:~ smr$
[smr:~ smr$ fgrep truncate /opt/antelope/5.7/data/pf/rtexec.pf
## cleanlogs LOCAL 5 1 * * * truncate_log -r logs/*
smr:~ smr$
```


- Process restarts can indicate failure
- but sometimes they are intentional e.g. during db maintenance.

```
ranbeta:/aspen/rt_aspen/rtsystemPROC database=db/dpc orb=  
2018-111 03:00:00 epochnotify: Wed Apr 26 22:26:53 2017 <#>  
  
Current time:  
4/21/2018 (111) 3:00:00.000 UTC  
4/21/2018 (111) 5:00:00.000 Daylight Savings Time  
  
No System shutdowns since midnight 4/20/2018 UTC  
no shutdowns ever recorded.  
  
Process restarts since midnight 4/20/2018 UTC:  
09:44:37 orbdetect  
09:44:40 orbassoc  
09:44:44 magnitudes  
09:44:47 orbwfmeas  
09:44:50 orb2wf  
09:44:53 orb2db  
09:44:56 orb2dbt
```

Process restarts since midnight 4/20/2018 UTC:
09:44:37 orbdetect
09:44:40 orbassoc
09:44:44 magnitudes
09:44:47 orbwfmeas
09:44:50 orb2wf
09:44:53 orb2db
09:44:56 orb2dbt

rtsys

Ignoring specific messages

16

- Add messages to be **ignored, unless** important
- Do not exclude critical messages!!
- Change # of excessive log lines

```
smr — smr@ranalfa:~/rtsystemACQ — ssh ranalfa — 80x31
[[smr@ranalfa rtsystemACQ]$ pfecho rtsys
excessive_log_lines    10
ignore &Tbl{
    orbdetect.*frame overlap
    orbdetect.*frame discarded
    Trimming
    rtexec.pf changed: reinitializing
    overflows field
    dddd-ddds+d+:dd:dd starting
    quitting from resurrection alarm
    orb2logs .* read old state file
    orb2logs .* resurrection successful: repositioned to pktid
    orbexec .* Nothing to process for event
    orbserver .* failed to send reap packet to .*@10.203.12.
}
logs_to_ignore &Tbl{
    logs/cron-sysreport
    logs/cron-rtreport
    logs/cron-rtsys
    logs/rtexec.pid
}
logs/cron-rtreport
logs/incident.*
}
pf_revision_time      1493070874
unless &Tbl{
    Permission denied
}
[[smr@ranalfa rtsystemACQ]$
```

orbserver .* failed to send reap packet to .*@10.203.12.

- “**0 Problems**” mails can be suppressed
- “**-p**” sends mail only when at least 1 problem is detected.

Incident and bug reports

Keeping BRTT informed..

18

- rtexec.pf parameter
- Add your own email
- Separate with comma
- Keep BRTT informed

```
smr — -bash — 80x16
[smr:~ smr$ man rtexec | fgrep -A3 email_incident_reports ]
    email_incident_reports
        When a program dies due to a segmentation violation or bus
        error, an incident report is generated by rtincident(1). A copy
        of this report is sent via email to the addresses specified in
[smr:~ smr$ grep -B5 ^email_incident_reports /opt/antelope/5.7/data/pf/rtexec.pf ]
# When a program dies due to a segmentation violation
# or bus error, an incident report is generated.
# email_incident_reports may be set to a list of recipients
# who will get these reports by email. BRTT likes to receive
# reports if a standard Antelope program dies this way.
email_incident_reports incidents@brtt.com
smr:~ smr$ █
```

```
email_incident_reports incidents@brtt.com
```

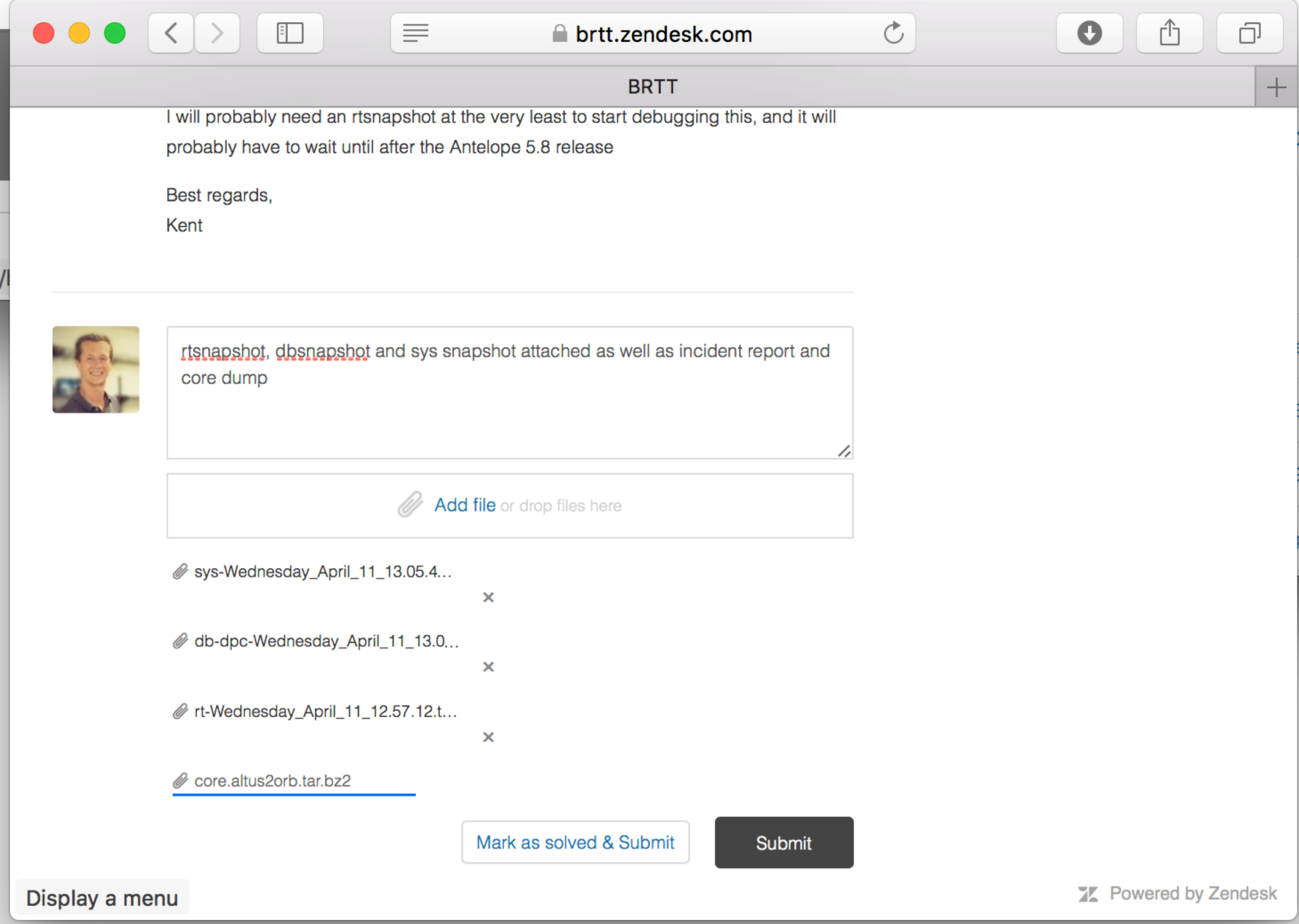
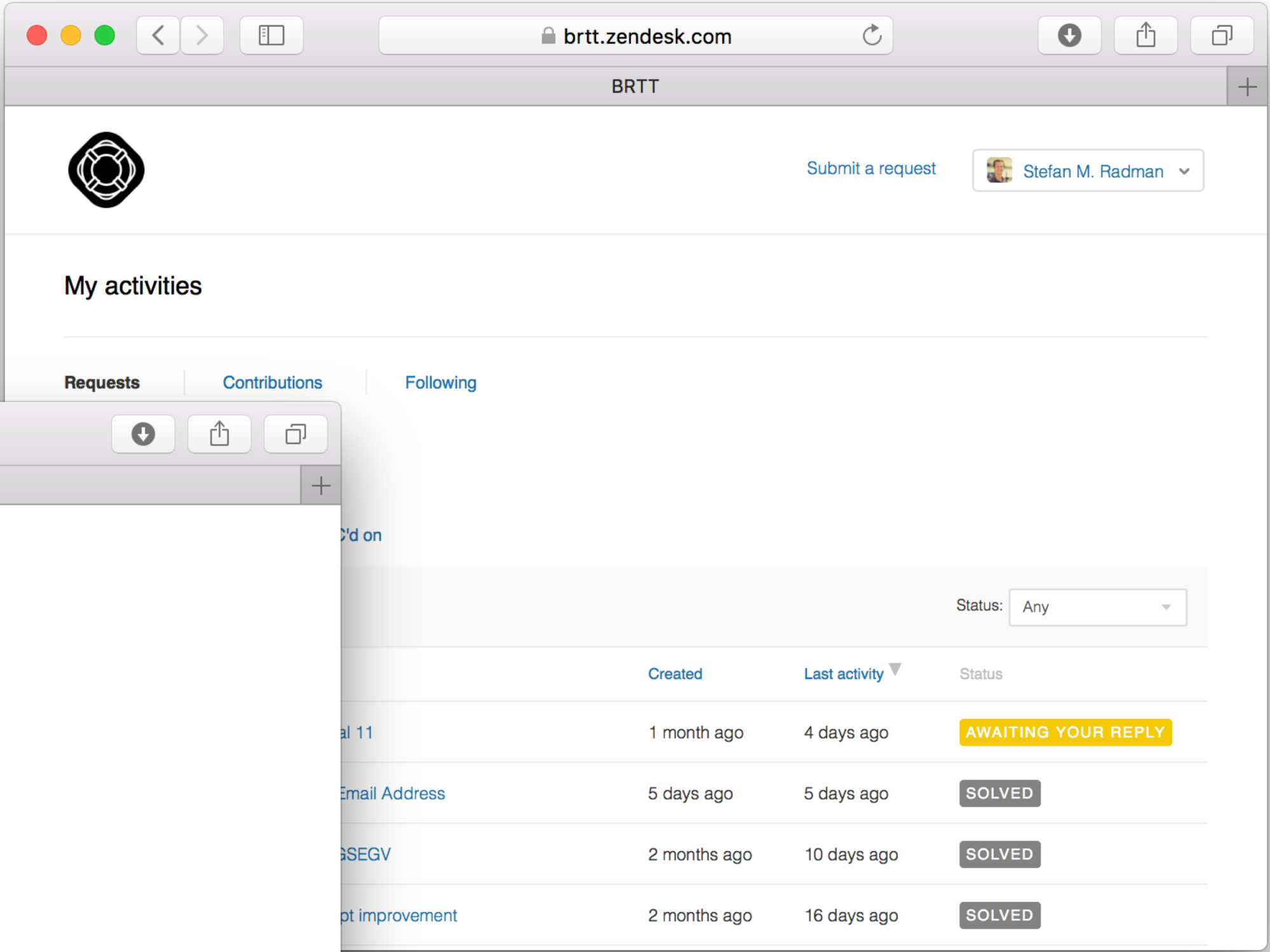
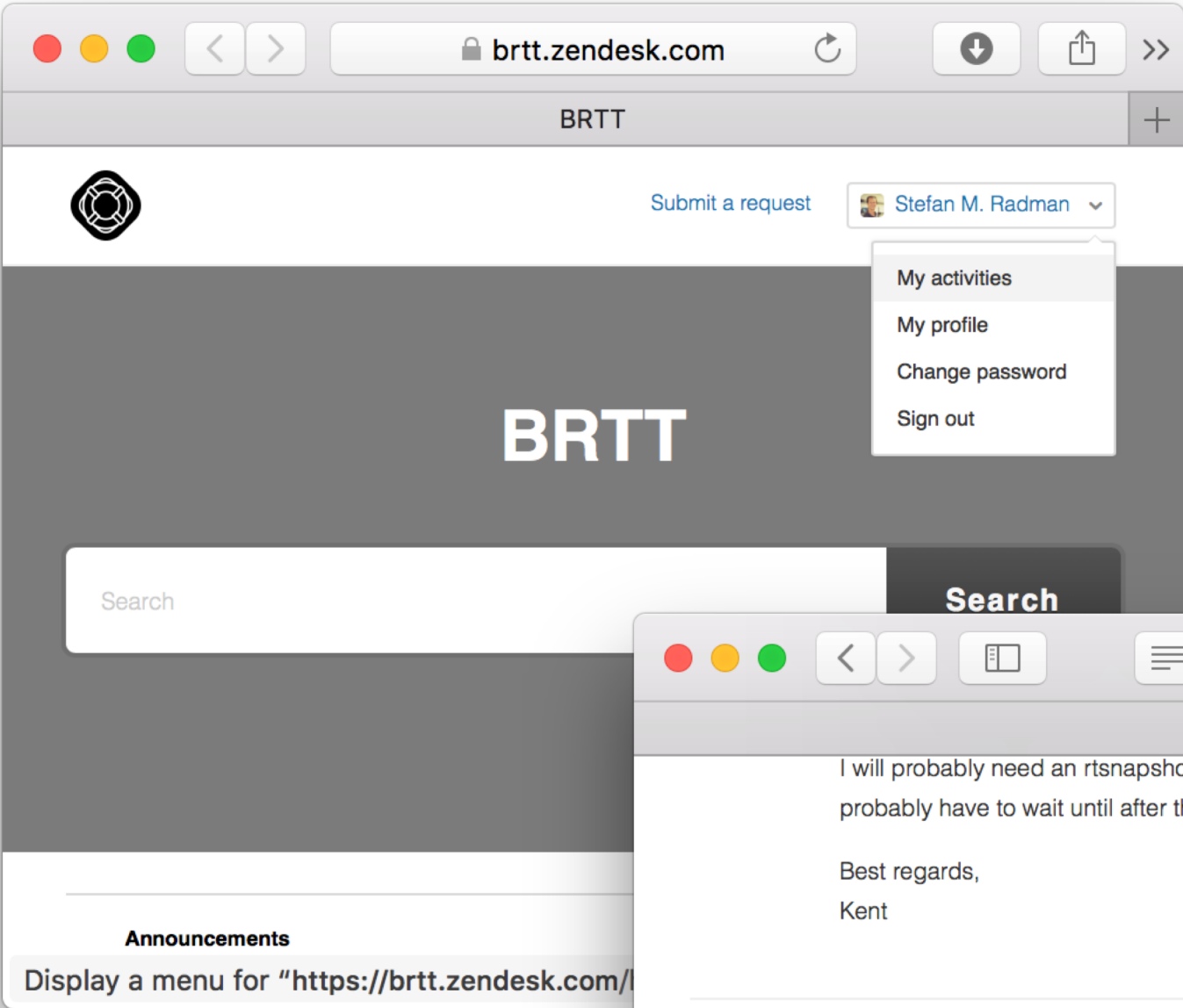

Reporting incidents

Basics

- Create snapshots to capture the status of the system: rtsnapshot, dbsnapshot, syssnapshot
- Email support@brtt.com
- Describe what happened and what you did (if anything).
- Include information on the computing environment
 - Operating system version
 - Antelope version and patch level (“antelope_update -1”)
- Include incident report (if available)
- If you can reproduce the issue, describe how.

Reporting incidents

BRTT Zendesk



Reporting incidents

Coredumps etc

21

- Look for coredump in "logs" directory (e.g. logs/core.orb2orb)
- Check date to see if it is current or old
- Do not attach coredump files to emails! They can be very big.
- Compress coredumps and attach them to the request in Zendesk together with the snapshots
- reporting - How to Report Bugs Effectively
<file:///opt/antelope/5.8/html/reporting.5.html>

Troubleshooting the Antelope Realtime System

Not the end. Just the beginning.

22

Thanks for listening