Analysis and mitigation of writeback cache lock-ups in Linux

Alba Mendez Orero

Project Critical Review

REVISION HISTORY AND APPROVAL RECORD

Revision	Date	Purpose
1	2020-03-31	Initial version
2	2020-04-12	Incorporate latest updates

DOCUMENT DISTRIBUTION LIST

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1. CONTENTS

2. GENERAL COMMENTS ABOUT THE WORK PROGRESS

2.1. *Incidences*

COVID-19 is impacting our ability to conduct follow-up sessions, but fortunately not much as this is closer to a software project than a hardware one. There is also a one-week delay from the initial work plan, this is mostly attributable to COVID-19 as well.

2.2. *Progress*

Related to the above is User-Mode Linux, which has been adopted as a way of conducting experiments and measures in a kernel without running it in actual hardware. This *improves reproducibility*, as lots of factors can now be controlled, enables the experiments to be *fully automated*, and enables a quick testing / debugging workflow. UML, unlike Virtual Machines, needs no privileges or hardware support and is easily automatable.

All in all, WP1 has been finished and we are now working at tasks 1 / 2 of WP2 and will soon start developing the patch, which —unlike what was foreseen in the work plan— will probably be in form of a kernel module or patch.

2.3. *Work Plan modifications*

No work plan modifications were deemed necessary.

3. UPDATED WORK PLAN

3.1. *Updated Work Packages, Tasks and Milestones*

Work Packages:

Project: Analysis	WP ref: WP1	
Major constituent: measurement & analysis	Sheet 1 of 1	
Short description: Develop necessary tools to non-invasibly measure and analyze the dynamics of the I/O throttling and how it affects other processes.	Planned start date: 2020-03-01 Planned end date: 2020-03-28	
Internal task T1: real-time monitor Internal task T2: ftrace analysis Internal task T3: dummy loads / processes Internal task T4: perform basic tests Internal task T5: perform cgroup tests	Deliverables: None	Dates: None

Project: Implementation	WP ref: WP2	
Major constituent: design & development	Sheet 1 of 1	
Short description: Understand throttling dynamics. Design & develop Proof of Concept to (partly) isolate throttling	Planned start date: 2020-03-29 Planned end date: 2020-05-02	
Internal task T1: understand throttling dynamics Internal task T2: design general operation, validate it Internal task T3: PoC development Internal task T4: perform basic tests	Deliverables: Critical review	Dates: None

Project: Discussion	WP ref: WP3	
Major constituent: testing & deployment	Sheet 1 of 1	
Short description: Test the PoC in production systems, measure improvement, optionally develop proper kernel patch	Planned start date: 2020-05-03 Planned end date: 2020-06-08	
Internal task T1: production test, measures Internal task T2: improvement anaysis Internal task T3: [Optional] kernel patch development	Deliverables: Final memory, source code	Dates: None

3.2. *Updated Time Plan (Gantt diagram)*