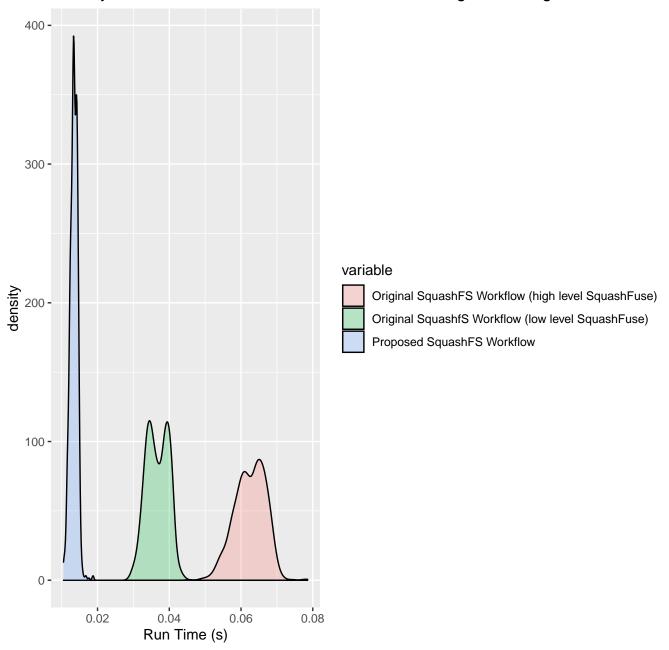
Density of Run Times for Charliecloud Container Run Workflows 40 variable Unpacked Tar Ball Workflow density Original SquashFS Workflow (high level SquashFuse) Original SquashfS Workflow (low level SquashFuse) Proposed SquashFS Workflow 20 -0 -0.1 0.2 0.3 0.4 Run Time (s)

Distribution of Run Times for Charliecloud Container Run Workflows 0.4 -Run Time (s) variable Unpacked Tar Ball Workflow Original SquashFS Workflow (high level SquashFuse) Original SquashfS Workflow (low level SquashFuse) Proposed SquashFS Workflow 0.2 -0.1 -OSFW(IS OSSW(IS PSFW UTBW Charliecloud container run workflows

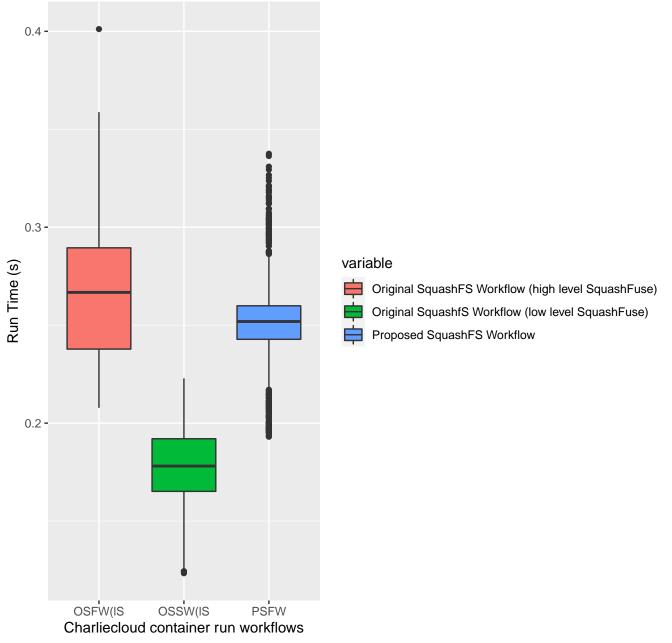
Density of Run Times for Charliecloud Container Image Mounting



Distribution of Run Times for Charliecloud SquashFS Mounting 0.08 -0.06 -Run Time (s) variable Original SquashFS Workflow (high level SquashFuse) Original SquashfS Workflow (low level SquashFuse) Proposed SquashFS Workflow 0.02 -OSFW(IS OSSW(IS PSFW Charliecloud container run workflows

Density of Run Times for Charliecloud Container Image Execution 30 -20 variable density Original SquashFS Workflow (high level SquashFuse) Original SquashfS Workflow (low level SquashFuse) Proposed SquashFS Workflow 10 -0 -0.2 0.3 0.4 Run Time (s)

Distribution of Run Times for Charliecloud SquashFS Container Execution



Density of Run Times for Charliecloud Container Image Unmounting 30 -20 variable density Original SquashFS Workflow (high level SquashFuse) Original SquashfS Workflow (low level SquashFuse) Proposed SquashFS Workflow 10 -0 -0.2 0.3 0.4 Run Time (s)

Distribution of Run Times for Charliecloud SquashFS Unmounting 0.4 -0.3 variable Run Time (s) Original SquashFS Workflow (high level SquashFuse) Original SquashfS Workflow (low level SquashFuse) Proposed SquashFS Workflow 0.2 -PSFW OSFW(IS OSSW(IS Charliecloud container run workflows

