Rockchip Linux Benchmark KPI

ID: RK-CS-YF-375

Release Version: V1.3.0

Release Date: 2024-09-20

Security Level: □Top-Secret □Secret □Internal ■Public

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Preface

Overview

This document provides an overview of some data references for Linux Benchmark benchmark testing. It is intended to assist customers in referencing and comparing during the secondary development process.

Target Audience

This document (this guide) is primarily applicable to the following engineers:

Technical Support Engineers

Software Development Engineers

Revision History

Date	Version	Author	Modification Description
2020-08-05	V1.0.0	Caesar Wang	Initial version
2021-04-01	V1.1.0	Caesar Wang	Added RK3566, RK3568 KPI
2023-04-13	V1.2.0	Caesar Wang	Added RK3562, RK3588 KPI
2024-09-20	V1.3.0	Caesar Wang	Added RK3576 KPI Updated latest SDK benchmark data

Contents

1. Test Environment

Detailed information about the hardware and software environment is provided, including ARM chip models, CPU core counts, memory capacities, and storage configurations.

Chip	Rockchip EVB Development Board	Operating System	SDK Version	Hardware Configuration
RK3588	rk3588_evb1_lp4_v10	Buildroot	Tag version: linux-5.10-gen-rkr4	CPU: Octa-core, frequency big cores 2.3G small cores 1.8G DDR: Frequency 2112M, capacity 8G GPU: Frequency 1G FLASH: 32G eMMC
RK3576	rk3576_evb1_v10	Buildroot	Tag version: linux-6.1-stan-rkr4	CPU: Octa-core, frequency big cores 2.2G small cores 2.0G DDR: Frequency 2112M, capacity 4G GPU: Frequency 950MHz NPU: Frequency 900MHz FLASH: 256G UFS
RK3562	rk3562_evb2_ddr4_v10	Buildroot	Tag version: linux-5.10-gen-rkr4	CPU: 4-core A53, 2016M DDR: Frequency 1332M, capacity 2G GPU: Frequency 900M NPU: Frequency 1000MHz FLASH: 256G eMMC
RK3568	rk3568_evb1_ddr4_v10	Buildroot	Tag version: linux-5.10-gen-rkr4	CPU: 4-core A55, 1992M DDR: Frequency 1560M, capacity 2G GPU: Frequency 800M NPU: Frequency 900MHz FLASH: 32G eMMC
RK3566	rk3566_evb2_lp4x_v10	Buildroot	Tag version: linux-5.10-gen-rkr4	CPU: 4-core A55, 1.8G DDR: Frequency 1056M, capacity 2G GPU: Frequency 800M NPU: Frequency 900MHz FLASH: 16G eMMC
RK3399	rk3399_evb_ind_lpddr4	Buildroot	Tag version: linux-5.10-gen-rkr4	CPU: Hexa-core, big cores 2xA72, 1.8G small cores 4XA53, 1.4G DDR: Frequency 856M, capacity 4G GPU: Frequency 800M FLASH: 16G eMMC
RK3326	rk3326_evb_lp3_v12	Buildroot	Tag version: linux-5.10-gen-rkr4	CPU: 4-core A35, 1.3G DDR: Frequency 666M, capacity 2G GPU: Frequency 520M FLASH: 8G eMMC

Chip	Rockchip EVB Development Board	Operating System	SDK Version	Hardware Configuration
RK3288	rk3288_evb_rk808	Buildroot	Tag version: linux-5.10-gen-rkr4	CPU: 4-core A17, 1.6G DDR: Frequency 528M, capacity 2G GPU: Frequency 600M FLASH: 8G eMMC

2. Testing Methods

Provide a detailed description of the testing methods and tools you used, as well as the settings for each test item. Ensure that readers can reproduce your tests.

System Performance Mode Setup

```
echo performance | tee $(find /sys/ -name *governor) /dev/null || true
```

2.1 Glmark2 Testing

Execute the following command for testing:

```
/rockchip-test/gpu/gpu_test.sh
```

2.2 UnixBench Testing

Run the following command for testing:

```
/opt/unixbench/Run
```

3. Test Results

3.1 Buildroot System

3.1.1 Glmark2

glmark2 is an OpenGL 2.0 and ES 2.0 benchmarking tool. The full-screen and off-screen mode scores for various chips are listed in the table below:

Item	RK3588	RK3576	RK3562	RK3568	RK3566	RK3399	RK3326	RK3288
Normal Screen (800x600)	4851	1713	676	560	485	812	369	57
Off Screen	3550	1864	644	596	531	687	419	604
Full Screen	2780	788	287	240	224	183	253	52
GPU Type	Valhall-G610	Mali-G52	Mali-G52	Mali-G52	Mali-G52	Mali-T864	Mali-G31	Mali-T764
Screen resolution	1080x1920	1080x1920	1080x1920	1080x1920	1080x1920	1536x2048	720x1280	1536x2048

3.1.2 UnixBench

UnixBench aims to provide basic performance metrics for Unix-like systems; the reference scores for various chip test items are as follows:

- System performance when running a single task

Item	RK3399	RK3288	RK3326	RK3566	RK3568	RK3562	RK3576	RK3588
Dhrystone 2 using register variables	19191210.4	10626086.6	5704897.1	12332588.0	13176039.3	10821835.3	22932325.5	34493007.3
Double-Precision Whetstone	3303.5	1718.9	1565.2	2965.9	3164.5	2464.3	4103.7	6665.4
Execl Throughput	2730.8	1538.1	787.9	1483.6	1703.0	1815.3	2678.3	5695.8
File Copy 1024 bufsize 2000 maxblocks	263262.3	163001.5	125333.2	166135.4	175490.6	247437.6	432878.6	832875.7
File Copy 256 bufsize 500 maxblocks	98335.8	50635.1	37871.9	48956.5	51574.7	74740.7	145359.2	253871.4
File Copy 4096 bufsize 8000 maxblocks	677993.2	384632.9	321189.7	440209.9	461129.3	610768.8	1098724.6	1831983.9
Pipe Throughput	775302.3	357578.5	300305.5	521804.1	557997.0	619105.4	779828.1	1644863.6
Pipe-based Context Switching	87345.3	54247.5	37434.5	51766.2	53873.8	61437.0	105369.5	217180.2
Process Creation	4274.2	3512.1	2086.0	3782.4	4041.7	5113.1	4232.7	5272.1
Shell Scripts (1 concurrent)	2944.0	2973.3	1474.2	2352.0	2817.2	2301.5	2598.5	3254.2
Shell Scripts (8 concurrent)	832.4	703.2	431.7	567.3	675.6	647.6	976.8	2092.6
System Call Overhead	721899.8	624614.1	568868.6	783414.7	836985.7	838824.4	621437.6	1322359.7
System Benchmarks Index Score	654.7	421.7	290.6	456.9	497.3	533.3	761.6	1342.5

- System performance when running multiple tasks

Item	RK3399	RK3288	RK3326	RK3566	RK3568	RK3562	RK3576	RK3588
Dhrystone 2 using register variables	61892645.4	41527276.3	22821903.2	47931915.4	51737187.8	42342893.2	133846256.4	182453805.7
Double-Precision Whetstone	13192.2	6870.1	6265.7	11545.6	12431.5	9699.1	27875.6	38815.5
Execl Throughput	6638.9	4127.0	2449.4	3272.1	3951.1	4359.4	10082.5	23542.0
File Copy 1024 bufsize 2000 maxblocks	253903.6	265838.2	194293.5	236042.5	246968.0	436766.8	756330.5	681901.0
File Copy 256 bufsize 500 maxblocks	74647.0	74156.4	54107.4	65182.9	67873.4	117806.2	225876.4	189411.0
File Copy 4096 bufsize 8000 maxblocks	715699.5	709343.4	565091.8	639035.4	700693.2	1285002.9	1999953.4	1873825.2
Pipe Throughput	3159789.0	1323176.0	1191104.7	2031168.7	2191846.5	2427332.4	5664856.1	8951711.8
Pipe-based Context Switching	298324.6	134686.9	154652.2	202912.5	212649.7	306251.1	707269.5	1148297.7
Process Creation	11834.7	7412.8	5183.1	7036.5	7932.7	10979.8	17803.4	44316.5
Shell Scripts (1 concurrent)	7420.0	5710.9	3587.9	4613.8	5473.0	5027.4	9575.2	24379.9
Shell Scripts (8 concurrent)	952.5	744.6	477.4	593.1	707.7	688.4	1279.3	3455.2
System Call Overhead	2514699.7	2392234.7	2206337.3	2815382.8	3028273.6	3152888.0	3589591.2	3030469.3
System Benchmarks Index Score	1402.8	989.5	746.4	1039.1	1146.5	1365.4	2715.3	4036.2