SATA-IP Device Demo Instruction on AC701

Rev1.1 23-Aug-23

1 Environment Requirement 2
2 Demo setup 3
3 Operation Test on OS 7
4 Revision History 11

SATA-IP Device Demo Instruction on AC701

Rev1.1 23-Aug-23

This document describes SATA-IP Device evaluation procedure on AC701 using SATA-IP Device reference design bit-file. This design support fixed SATA-II speed.

1 Environment Requirement

To run the demo on FPGA development board, please prepare following environment

1. Xilinx Artix-7 FPGA AC701 Evaluation Kit
2. PC which supports SATA-II speed for connecting with SATA-II storage.
3. PC with installing Xilinx programmer software (Vivado) and SATA device connector on PC.
   Note: Serial console software such as HyperTerminal or TeraTerm for optional to monitor status. Set baud rate=115,200 / data=8bit / Non-Parity / Stop=1bit.
4. AB02-CROSSOVER with SATA standard cable to be SATA crossover cable
5. AB10-PATAFMC to be SATA connector of AC701 board
6. AB14-CLKSMA to be clock generator for SATA application
   Note: AB02-CROSSOVER, AB10-PATAFMC, and AB14-CLKSMA are provided by Design Gateway
7. micro USB cable for programming FPGA, connecting between FPGA board and PC
8. (Optional) mini USB cable for Serial console, connecting between FPGA board and PC

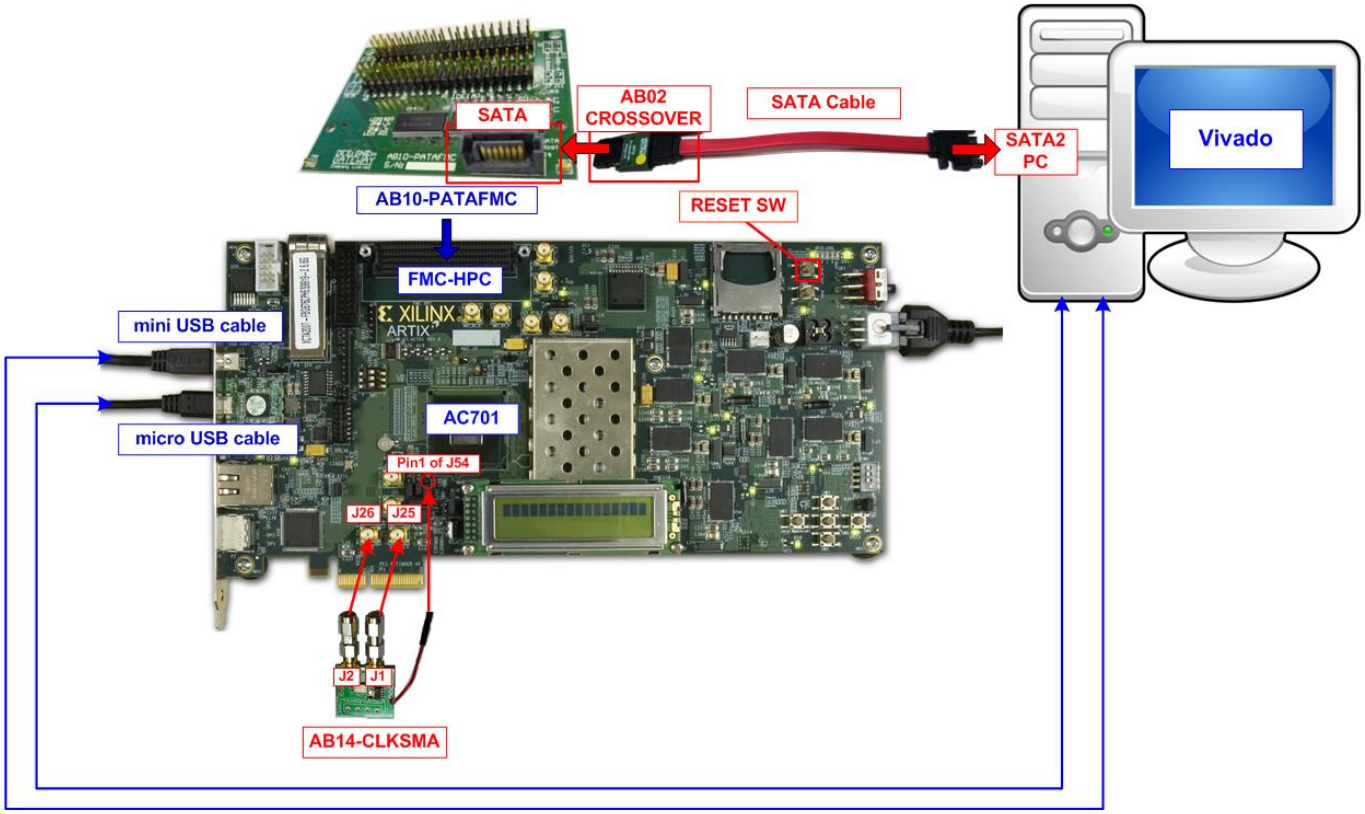

Figure 1-1 SATA device demo test environment

2 Demo setup

1. Power off system
2. Connect AB14-CLKSMA board to AC701 board. J1 and J2 which are SMA connector on AB14-CLKSMA board are connected to J25 and J26 which are SMA connector on AC701 board, as shown in Figure 2-1.
3. Connect power connector (Red cable) of AB14-CLKSMA board to pin 1 of J54 on AC701 board, as shown in Figure 2-1.
   Note: AB14-CLKSMA board is provided by Design Gateway.

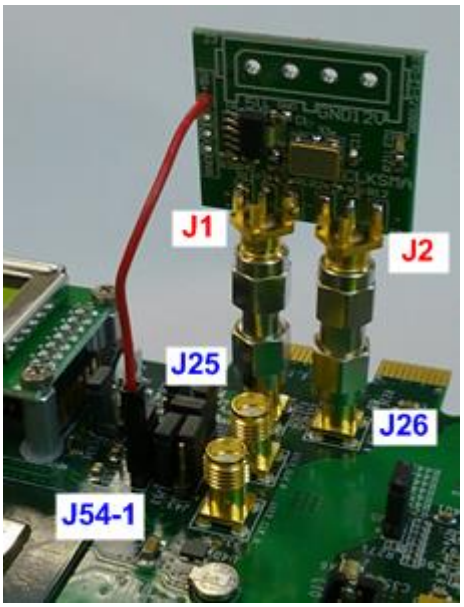

Figure 2-1 CLKSMA board connecting to AC701 board

4. As shown in Figure 2-2, connect SATA cable to AB02-CROSSOVER and then connect to AB10-PATAFMC. After that, connect another side of SATA cable to SATA-II connector on PC.

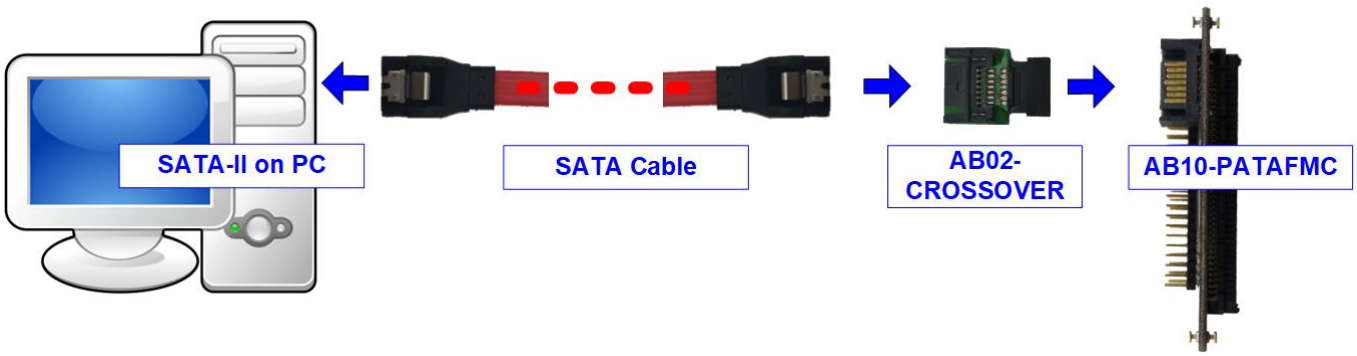

Figure 2-2 SATA connection between AB10 and SATA-II on PC

5. Connect AB10-PATAFMC to FMC-HPC connector (J30) on AC701, as shown in Figure 2-3

Figure 2-3 AB10 and AC701 connection

6. Connect micro USB cable from Digilent (U26) on AC701 board to PC for JTAG programming as shown in USB connector on AC701.
7. (Optional) Connect mini USB cable from AC701 board to PC for UART connection to display debug message. Open serial monitoring software such as TeraTerm. Terminal settings: Baud Rate=115,200 / Data=8 bit / Non-Parity / Stop=1.

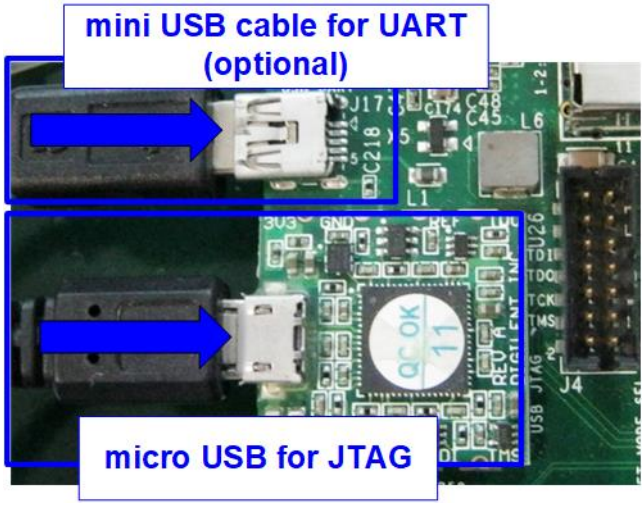

Figure 2-4 USB connector on AC701

8. Connect Power cable to AC701 board and then power up.

9. Download and program configuration file and firmware to AC701 by using Vivado tool, as shown in Figure 2-5.

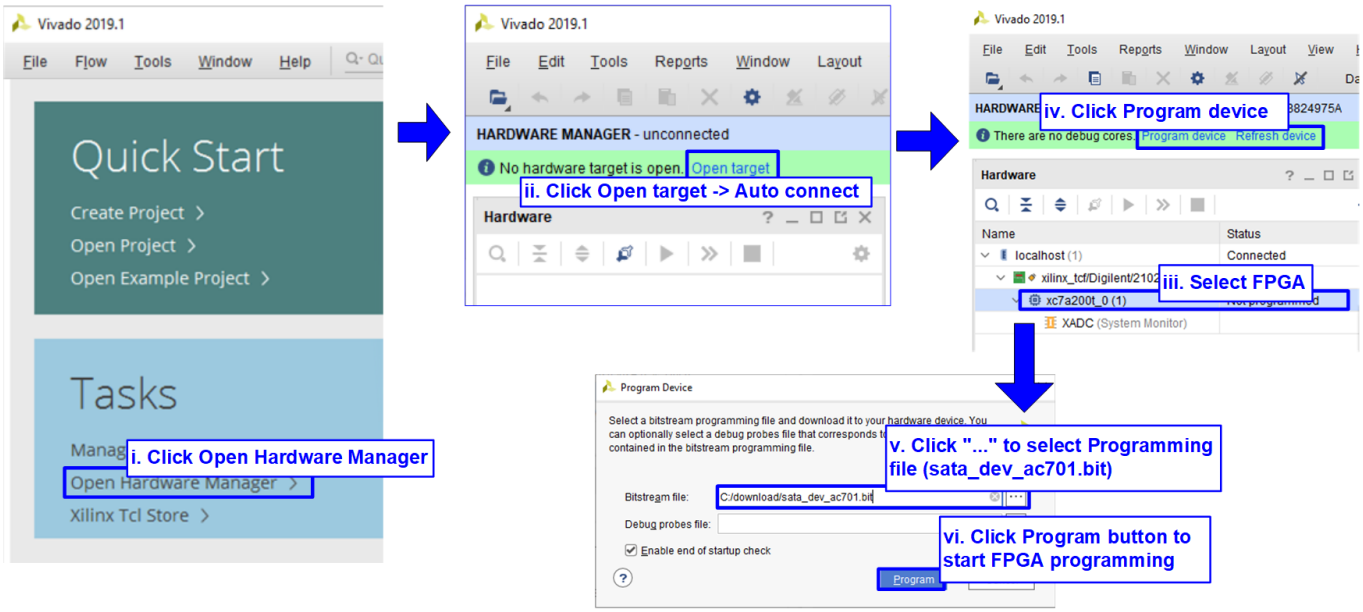

Figure 2-5 Programming configuration file

10. After FPGA starts operation, check GPIO LEDs status on AC701 board at LED0-LED1 that must be ON, as shown in Figure 2-6. Each LED description is described in Table 2-1.

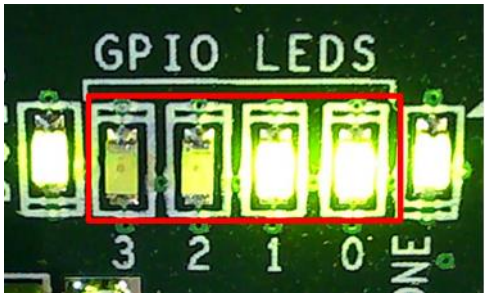

Figure 2-6 LED status after system set up complete

Table 2-1 LED Status of device reference design on AC701 board

LED	ON	OFF
LED0	OK	150 MHz of SATA clock on CLKSMA cannot lock. Please check 150 MHz clock source on CLKSMA board.
LED1	OK	SATA-IP cannot detect SATA-II host (PC). Please check SATA-II host and the connection.
LED2	Always OFF	
LED3		

11. (Optional) On PC Serial console, “Start SATA device design” and “Link up” are displayed, as shown in Figure 2-7. Now new disk is ready for Host PC.

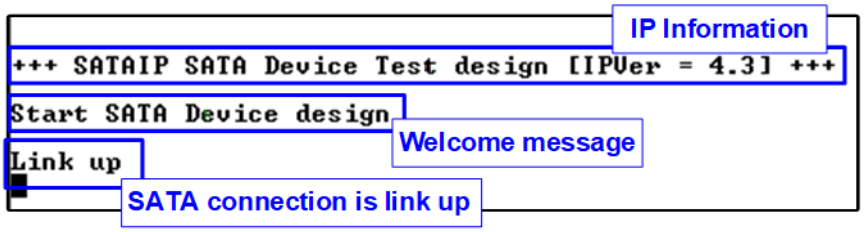

Figure 2-7 Welcome message and status of SATA device demo

3 Operation Test on OS

1. Open Device Manager on Windows10 OS. New SATA Device disk (DG SATA Device) is detected under “Disk drives”. If new disk is not auto-detected, open device manager and then select “Scan for hardware changes” under Disk drives icon to re-start new disk detection.
   Note: If the SATA device is connected as hot-plug (run after Windows OS boot-up completely), the M/B must be configured to support hot-plug detection on SATA connection. Otherwise, the user needs to reboot the PC to detect the new disk.

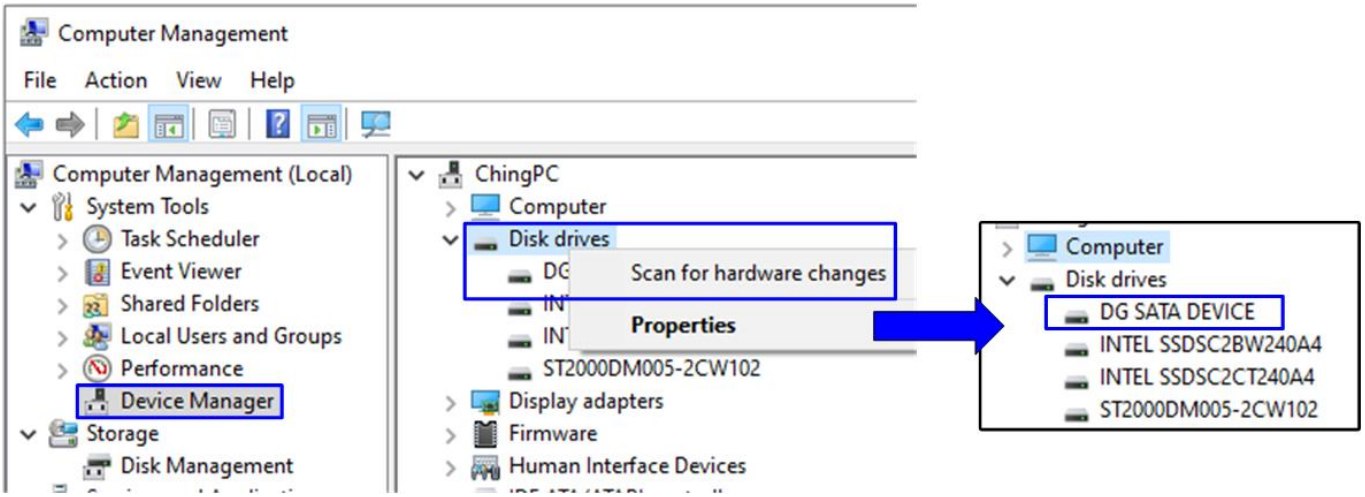

Figure 3-1 New disk detected on WindowsOS

2. Generally, the pop-up menu to initialize disk is displayed. Click “OK” button to confirm new disk initialization, as shown in the right window of Figure 3-2.
   Note: If no pop-up menu is displayed, select Computer Management -> Disk Management. The new disk which is unallocated is displayed. Select the new disk and select Initialize Disk menu, as shown in the left window of Figure 3-2.
   If new disk which is unallocated is not displayed, please close and re-open Disk Management.

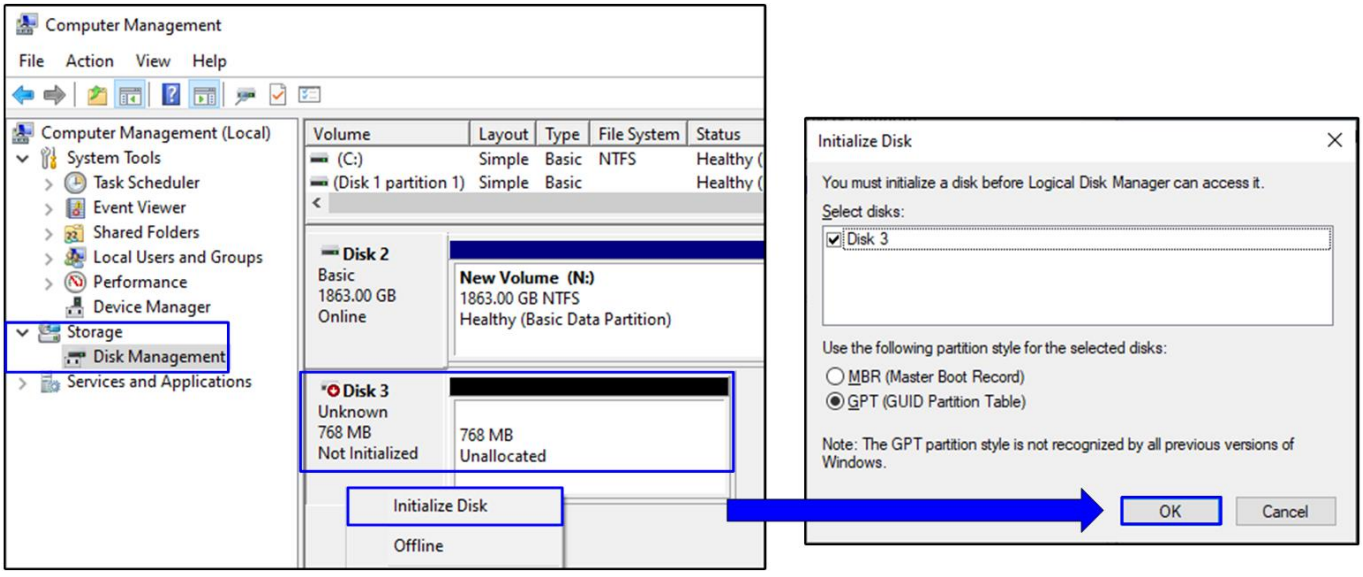

Figure 3-2 Initialize Disk

3. Wait until disk initialization is completed. After that, run the new disk test by Format the new disk. The first step is creating the new partition by right-click at Unallocated disk and select “New Simple Volume…”. After that, “New Simple Volume Wizard” is displayed. Click “Next” button to continue next step.

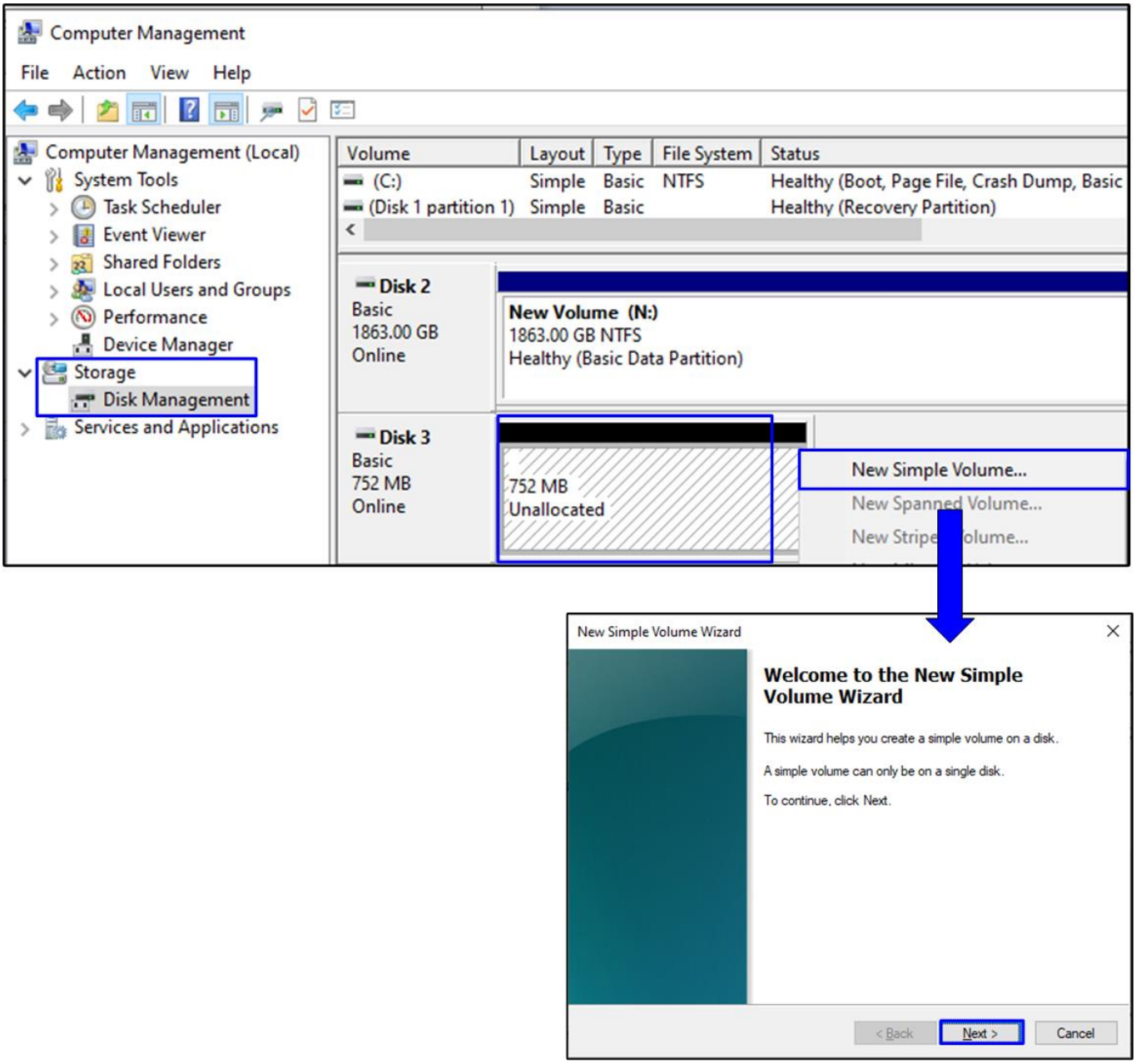

Figure 3-3 Create New Partition on New Disk

4. Click “Next” button for 3 times to continue next step, and then click “Finish” button to start Format disk. Wait until Format is completed.

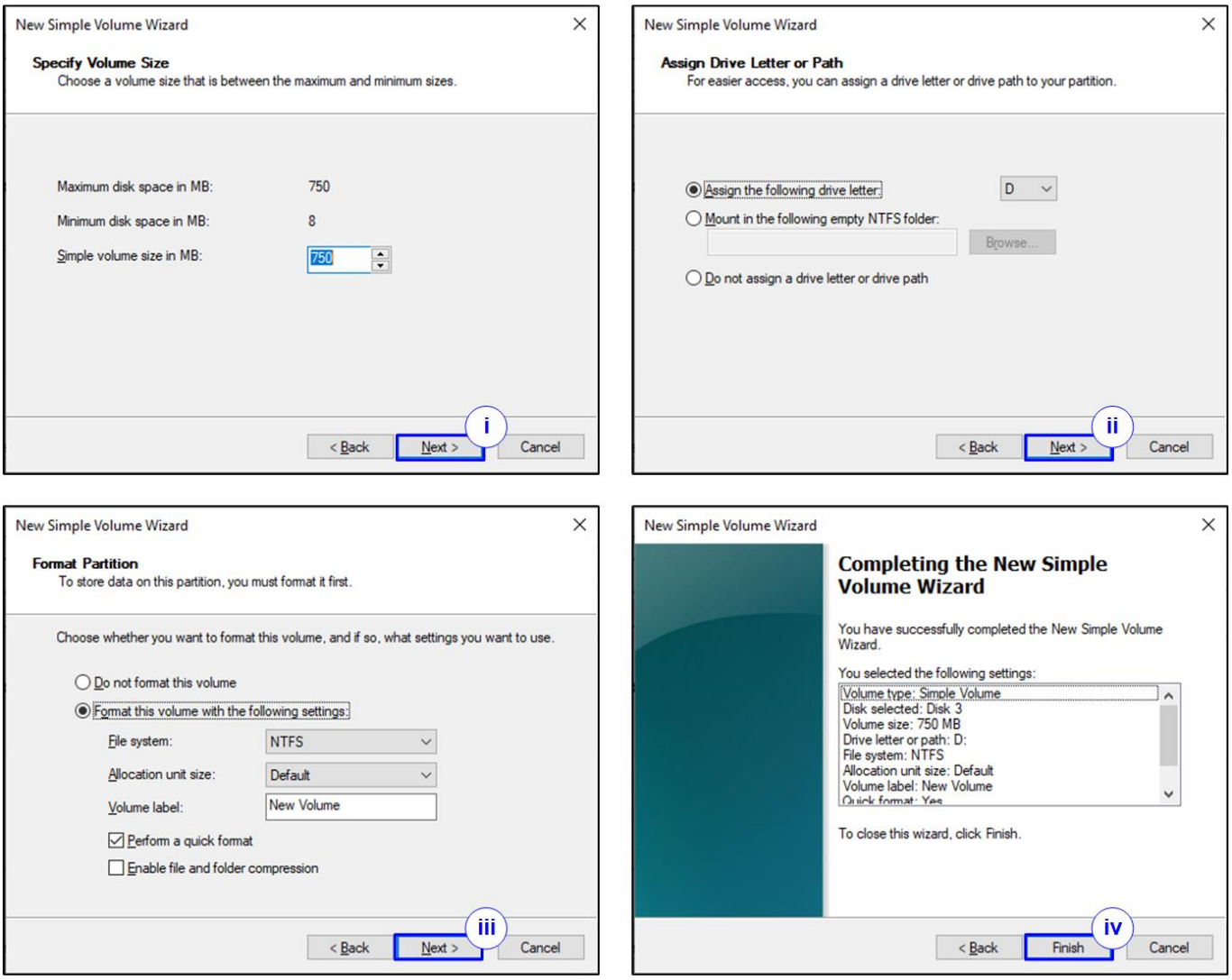

Figure 3-4 Format menu setup

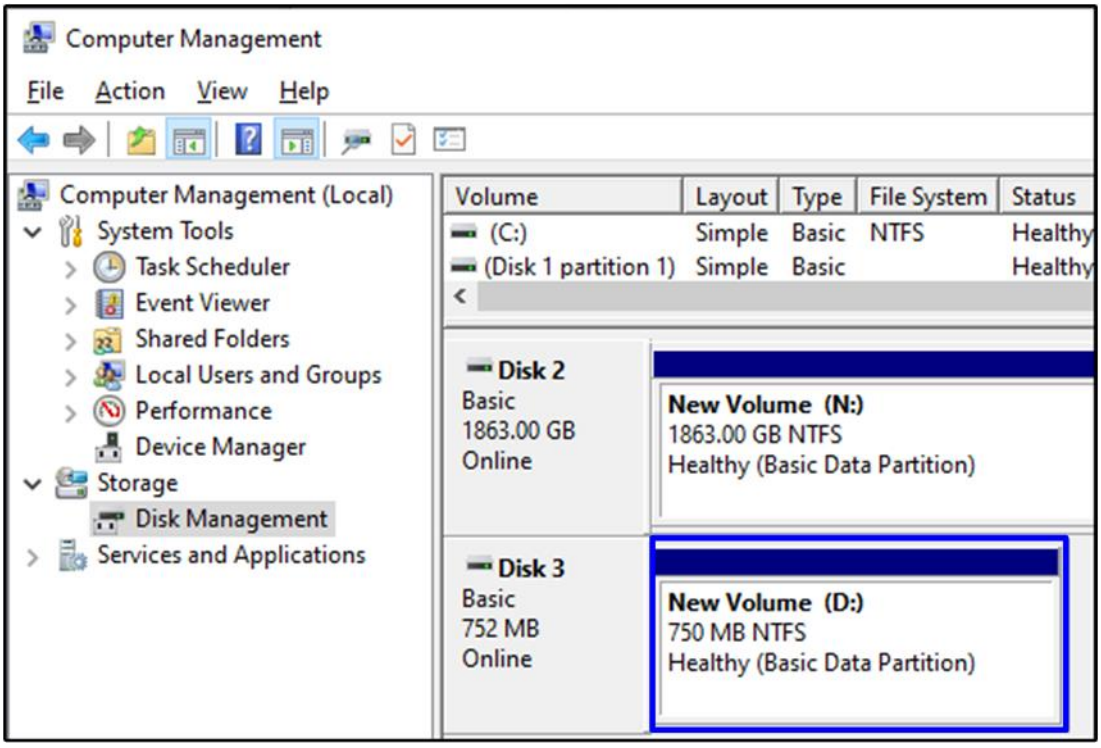

Figure 3-5 Format Complete

5. When the format is completed, new drive is ready to use, as shown in Figure 3-5. Now the user can run disk benchmark such as CrystalDiskMark for checking the operation and disk performance. Figure 3-6 shows example of disk performance by using CrystalDiskMark benchmark.

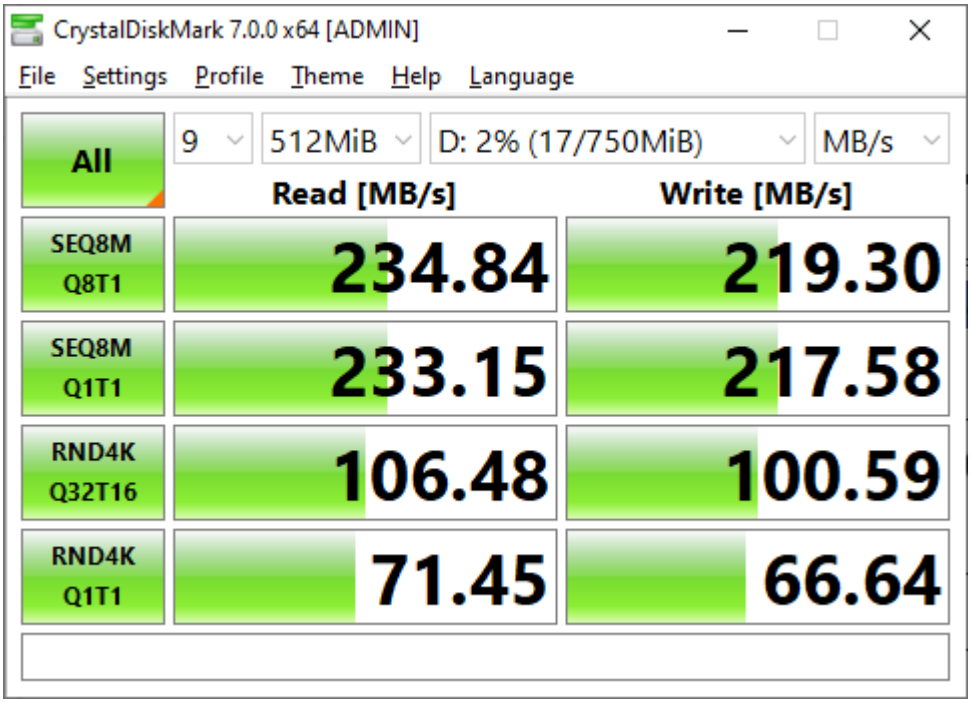

Figure 3-6 Disk perfornance test by benchmark (SATA-II device demo)

4 Revision History

Revision	Date	Description
1.0	11-Apr-14	Initial version release
1.1	17-Jun-21	Update adapter and SATA speed