SD Association

The role of SD Express Card Reader in SD Express-Ecosystem of Devices
讀卡機控制晶片在SD Express生態系的功能與定位

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Genesys Logic Inc. 創惟科技

ESTABLISHED	April, 1997
IPO at TAIWAN	May 22, 2001 (OTC: 6104)
BUSINESS SCOPE	IC Design, Develop, Test, and Distribute ICs, ASIC Service
PRODUCTS	Storage, USB Hub & PD, Image & Video, Analog, Silicon Intellectual Properties (IPs), Others
HEADQUARTERS	New Taipei City, Taiwan
SUBSIDIARIES	USA - Genesys Logic America, Inc. China - Eclat Holding Ltd

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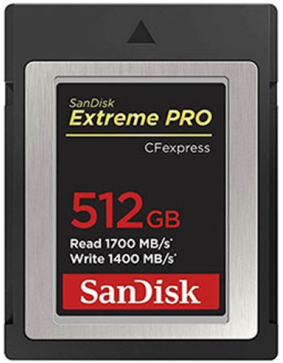
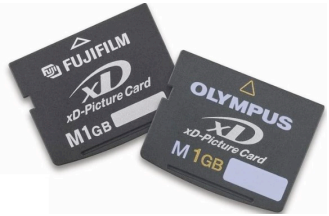
Memory Cards since 1992





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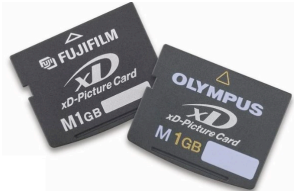
Memory Cards since 1992

PCMCIA Card

1992 1994 1997 1998 2000 2002 2009 2012



PCIe-based memory card

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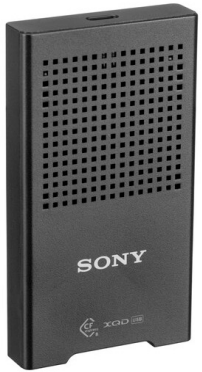
Various Choices of Card Reader Products



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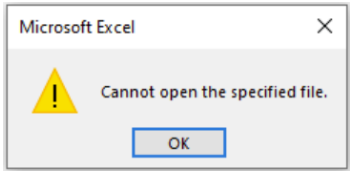
The Memory Card Reader Controller

- A bridge to transfer data from host to card or from card to host
- Data correctness and data integrity



- Maximum the compatibility to Host and Card
- Complete the data transfer in the shortest time
- Minimize the power consumption
- The consistent performance in every use

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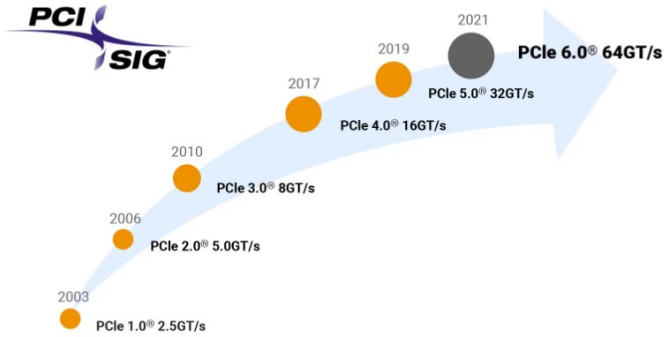
Leverage the Existing PCIe Technology

PCIe-based memory cards

- ✓ SSD-like storage in card form factor
- ✓ PCIe move to external from internal
- ✓ Fixed disk to removable device



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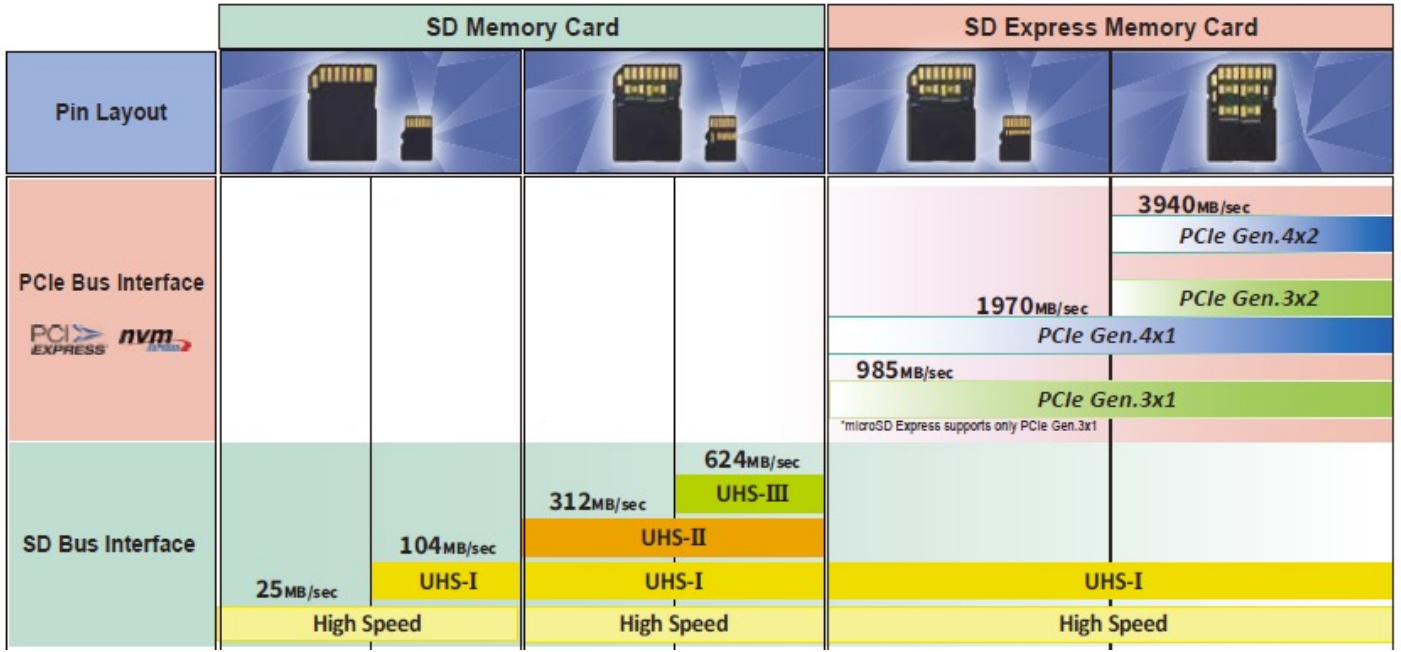
Backward Support of SD Express Card



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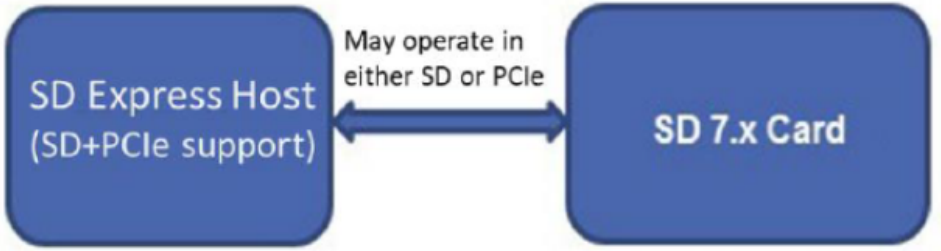
SD Express Host support both SD and PCIe interface

USB, PCIe



Support UHS-II ?

Without UHS-II

Source: *SD Express (SD7.x) Host Implementation Guideline*

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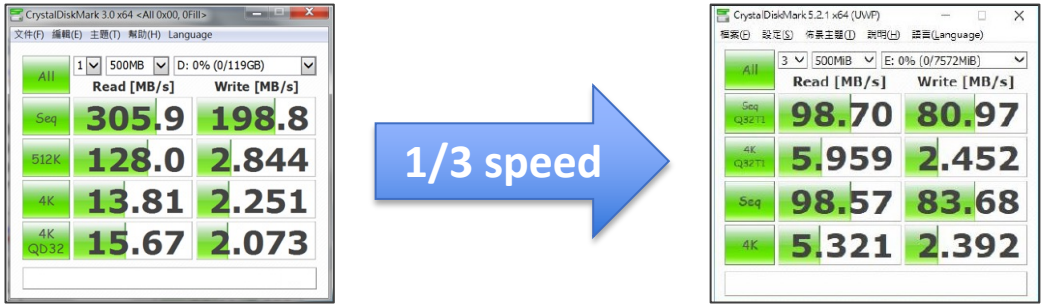
SD Express Reader support UHS-II is important

- **At least 79 cameras support UHS-II card slot in past ten years**
  - Canon, Fujifilm, Leica, Nikon, Olympus, Panasonic, Samsung, Sony…etc
- **All top brands of laptops support UHS-II card slot**
  - Apple, ASUS, Acer, Dell, HP, Lenovo, MSI, Chromebook…etc
- **Thunderbolt / USB-C docking support UHS-II card slot**

- **From the view point of SD reader vendor, it might be hard to explain to end users who only have UHS-II cards why their UHS-II cards perform more slowly with a new SD Express card slot than they older UHS-II card slot.**



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A Case: SD Express in Camera

- UHS-II card slot is widely supported by Cameras

- However, SD Express cards perform more slowly with the existing UHS-II card slot
- Meanwhile, CFexpress offer the high writing speed to card

- What we can do to make the SD Express card to be adopted by Camera ?

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Genesys Solution – GL9767
PCIe to SD8/7/4/3 all-in-one card reader controller

- The major applications of GL9767 are the internal SD Express card reader of laptop, mini PC, Server system, professional camera, game console and drone devices that demand the high speed of SD storage or the second SSD-like storage for the real memory expansion.
- The support of SD Express interface can be up to SD 8.0 SD Express (PCIe Gen.4 x 2) and support SD 8.0 SD Express (PCIe Gen.4 x 1), SD 8.0 SD Express (PCIe Gen.3 x 2) and SD 7.1 SD Express (PCIe Gen.3 x 1)
- GL9767 is the first SD Express card reader controller which can backward support SD 4.0 UHS-II speed mode and SD 3.0 UHS-I speed mode.
- For power saving, GL9767 support PCI Express ASPM, L1 sub-states (L1.1 and L1.2) and RTD3 (Runtime D3 Hot/Cold), Modern Standby and S0ix.
- The supported OS are Windows OS, Chrome OS and Linux OS

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Standard Version_Confidential

PCIe & SD - GL9767

- **Host interface**
  - Support 1-Lane 16 GT/s PCI Express Bus connect to PCIe host
  - Support 2-Lane 32 GT/s PCI Express Bus connect to PCIe host by system design

- **The supported SD specification**
  - Compliant with SD Specifications Part 1 Physical Layer Specification Version 8.0
  - Compliant with SD Specifications Part 1 Physical Layer Specification Version 7.1
  - Compliant with SD Specifications Part A2 SD Host Controller Specification Version 4.20

- **The supported SD cards and SD speed mode**
  - Secure Digital™ (SD), SDXC, SDHC, SDUC
  - SD 8.0 Express mode up to 3940 MB/sec
  - SD 7.1 Express mode up to 985 MB/sec
  - SD 4.0 UHS-II FD/HD mode up to 312 MB/sec
  - SD 3.0 UHS-I SDR104, SDR50 and DDR50

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GL9767 is the only SD host SVP product for both SD Express and UHS-II

SVP Verified Product List --- SD Express

Model	Company	Product Type
GL9767	Genesys Logic Inc.	Card & Host Interface Controller

SVP Verified Product List --- UHS-II

Model	Company	Product Type
GL9767	Genesys Logic Inc.	Card & Host Interface Controller

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SD Express Host Implementation

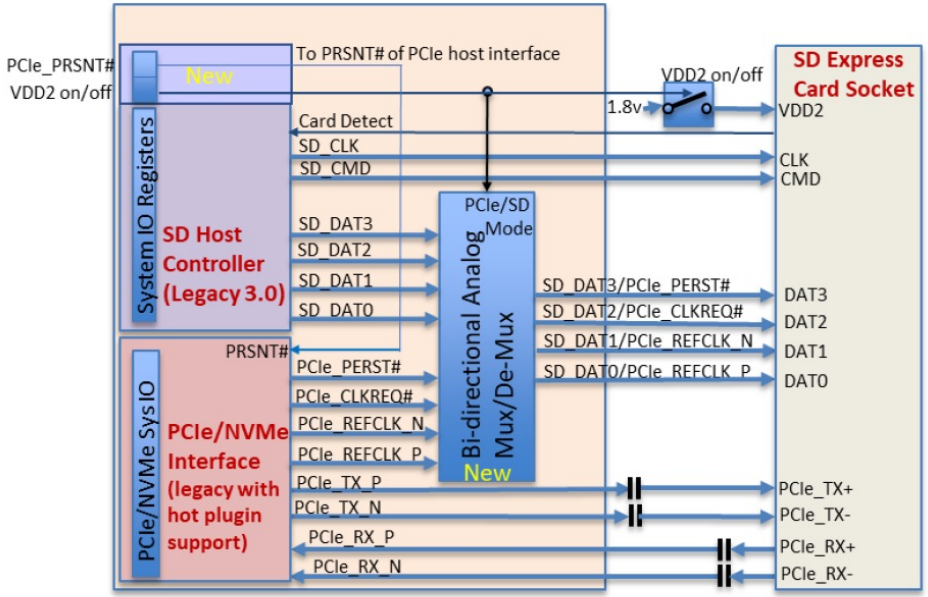

Figure 7 SD Express Host – Block Diagram

Source: *SD Express (SD7.x) Host Implementation Guideline*

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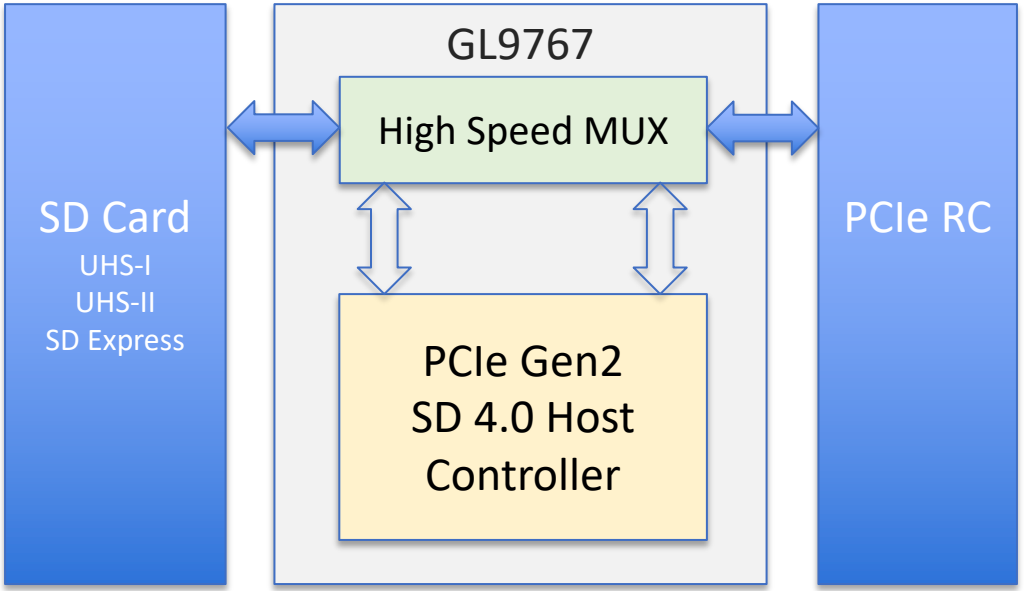
Controller Block Diagram – GL9767



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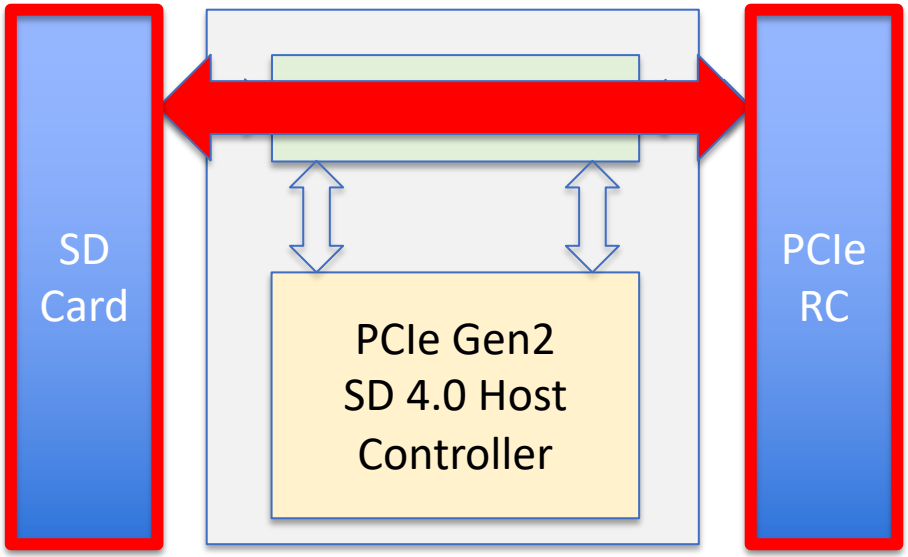
SD Express card directly connect to PCIe root complex and the in-box NVME driver is loaded



The PCIe root port need to enable PCIe hot-plug function to support SD7 card plug and un-plug

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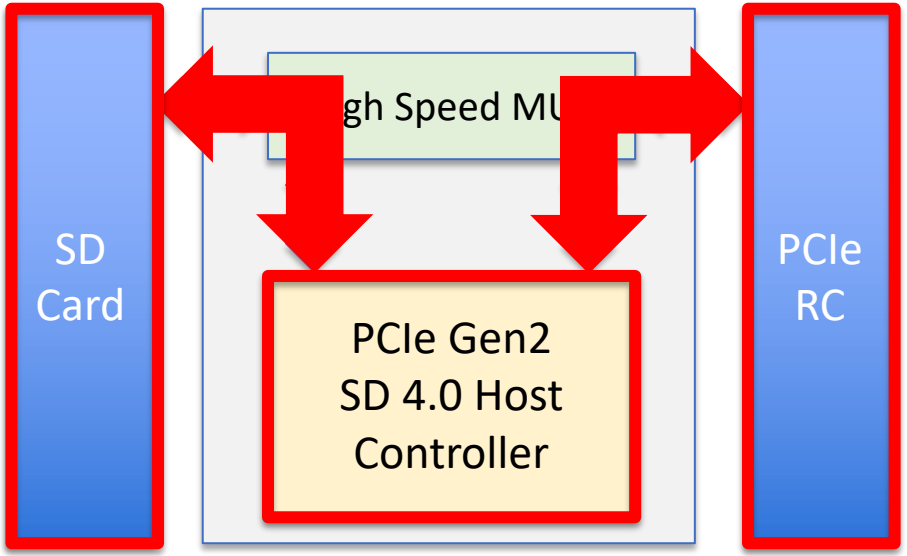
The legacy SD cards are initialized by the internal SD host controller and the vendor driver is loaded



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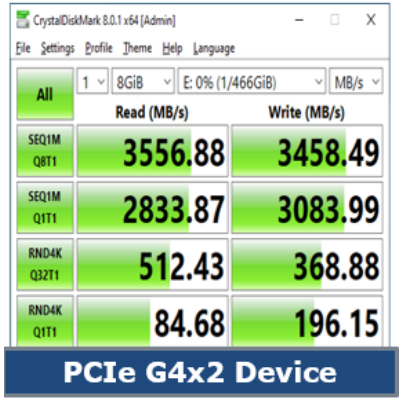
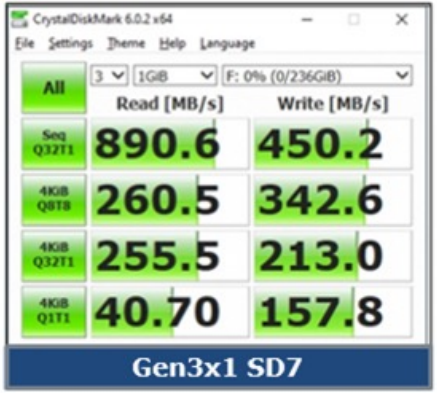
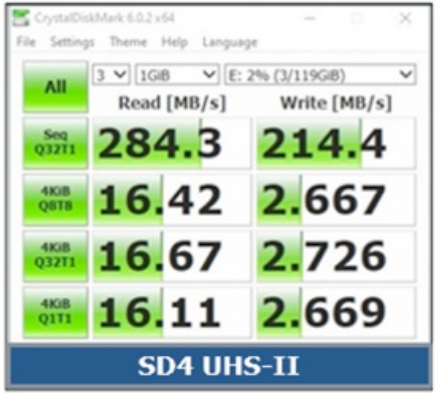
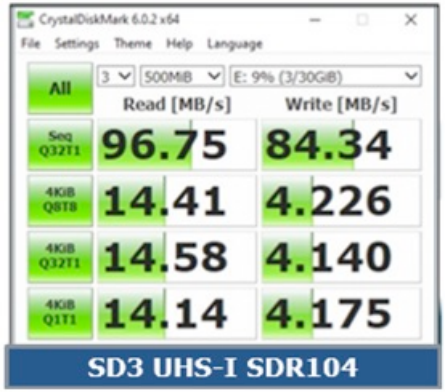
Benchmark test – GL9767









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Conclusion

讀卡機控制晶片在SD Express生態系的功能與定位
The Role of SD Express Card Reader in SD Express-Ecosystem

- Faster speed with PCI Express technology
- Don’t forget UHS-II have been widely adopted by various devices
- Genesys Logic’s all-in-one solution GL9767 is MP now

- Looking forward the grow up of SD Express market !

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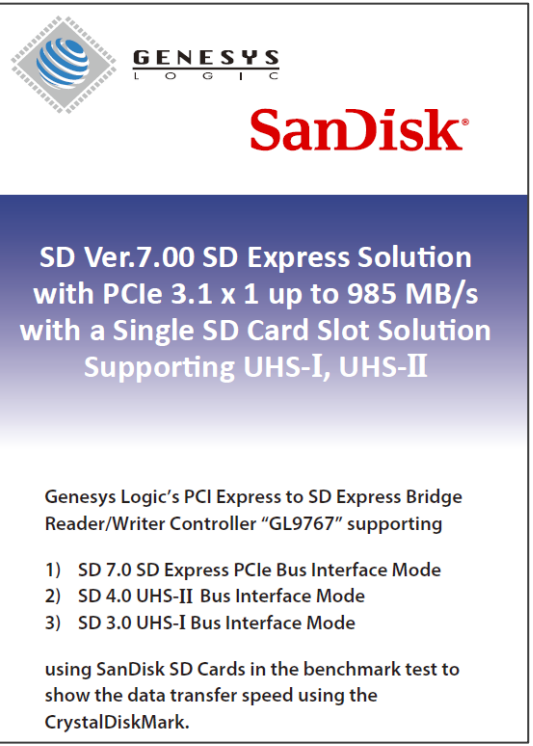
GL9767 Exhibition at SDA booth in Computex



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