Red Hat Enterprise Linux 7 - Install to Smart Array on Gen10 May Enumerate First Logical Disk as /dev/sdb

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Issue

A kickstart script expecting the local Smart Array disk to be enumerated as /dev/sda. On an HPE ProLiant DL380 Gen10 server, the default configuration may enumerate the first local Smart Array disk as /dev/sdb and enumerate the USB SD/MMC Card Slot as /dev/sda.

Environment

- DL380 Gen10
- UEFI
- Kickstart Installation
- Smart Array P816i-a SR Gen10
- SN1000Q Fibre HBA
- Built-in USB SD/MMC Generic SD controller enabled (default)

Cause

Red Hat clearly documents that /dev/sd* names are not persistent or guaranteed. These names are assigned dynamically during SCSI host and target discovery. The order that devices are discovered can change based on hardware timing and even between boots. Refer to: https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/7/html/installation_guide/sect-kickstart-syntax

Resolution

There are various methods to address this. The recommended method is to design a kickstart file or installation method such that it avoids assuming that a specific disk will be named "/dev/sda". However there are several options that can help ensure that the local Smart Array logical disk will be discovered first and will be assigned the name "/dev/sda".

- Disable "Internal SD Card Slot" in RBSU:
  RBSU -> System Options -> USB Options -> Internal SD Card Slot set to "Disabled"
 Smart Array logical disk is enumerated as /dev/sda. There is no longer a "Generic-" "SD/MMC CRW" device.

- Edit GRUB boot line for "Install Red Hat Enterprise Linux 7.6" and append " *rd.driver.pre=smartpqi*" to " *linuxefi*" line. Ctrl-X to boot with this option. This loads the Smart Array driver early and enumerates the Smart Array logical disks first, so they begin at /dev/sda. Device "Generic-" "SD/MMC CRW" is /dev/sdb. Refer to:
     https://access.redhat.com/solutions/2720551

- Edit GRUB boot line for "Install Red Hat Enterprise Linux 7.6" and append " *usb-storage.delay_use=10*" to " *linuxefi*" line. Ctrl-X to boot with this option. This delays scans for USB storage devices, allowing other controllers to detect and enumerate their devices first. Smart Array logical disk is enumerated as /dev/sda. Device "Generic-" "SD/MMC CRW" is /dev/sdb.

- Kickstart offers a directive (allowing wildcards) to ignore disks. Kickstart file syntax:

ignoredisk --drives=/dev/disk/by-id/usb*

would tell the installer to ignore all USB-storage devices as installation targets. For reference:
   https://access.redhat.com/solutions/66801

- Partitions created on the installation target can be specified with unique, persistent information
  like /dev/disk/by-id/* or /dev/disk/by-path/* rather than non-persistent /dev/sd* device name. For
  more details, see:
     https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/7/html/installation_guide/sect-kickstart-syntax

- If PCI slot for SN1000Q HBA is disabled, boot timing changes and Smart Array logical disk is
  enumerated as /dev/sda. Device "Generic-" "SD/MMC CRW" is /dev/sdb.

- Edit GRUB boot line for "Install Red Hat Enterprise Linux 7.6" and append " *usb-storage.blacklist=yes*"
  to " *linuxefi*" line. Ctrl-X to boot with this option. This prevents from being loaded the usb-storage
  driver required by the "Generic-" "SD/MMC CRW" device. Note that this option also prevents access to
  any other USB storage devices, including a USB DVD/CDROM or virtual iLO USB DVD. So this is a valid
  option for network-based installations but not for DVD- or ISO-based installs. See:
     https://access.redhat.com/solutions/726973

- It is also possible to write custom UDEV rules to identify a specific disk and create a unique name
  for use during installation. Refer to:
     https://access.redhat.com/solutions/1757653