uboot驱动模型(DM)分析(一) - gs1008612 - 博客园

uboot版本:uboot-201711

要分析uclass之前,首先得搞清楚两个宏**U_BOOT_DRIVER**及U_BOOT_DEVICE的作用:

1.**U_BOOT_DRIVER**及U_BOOT_DEVICE宏定义如下:

```
#define U_BOOT_DRIVER(__name)                       \
    ll_entry_declare(struct driver, __name, driver)

#define U_BOOT_DEVICE(__name)                       \
    ll_entry_declare(struct driver_info, __name, driver_info)

#define ll_entry_declare(_type, _name, _list)               \
    _type _u_boot_list_2_##_list##_2_##_name __aligned(4)       \
            __attribute__((unused,                  \
            section(".u_boot_list_2_"#_list"_2_"#_name)))
```

下面具体分析如下:

例如:

```
U_BOOT_DRIVER(serial_s5p) = {
    .name    = "serial_s5p",
    .id    = UCLASS_SERIAL,
    .of_match = s5p_serial_ids,
    .ofdata_to_platdata = s5p_serial_ofdata_to_platdata,
    .platdata_auto_alloc_size = sizeof(struct s5p_serial_platdata),
    .probe = s5p_serial_probe,
    .ops    = &s5p_serial_ops,
    .flags = DM_FLAG_PRE_RELOC,
};
```

根据上述宏定义展开得到:

```
ll_entry_declare(struct driver, serial_s5p, driver)
        struct driver _u_boot_list_2_driver_2_serial_s5p __aligned(4) __attribute__((unused, section(".u_boot_list_2_driver_2_serial_s5p"))) = {
            .name    = "serial_s5p",
            .id    = UCLASS_SERIAL,
            .of_match = s5p_serial_ids,
            .ofdata_to_platdata = s5p_serial_ofdata_to_platdata,
            .platdata_auto_alloc_size = sizeof(struct s5p_serial_platdata),
            .probe = s5p_serial_probe,
            .ops    = &s5p_serial_ops,
```

```
10              .flags = DM_FLAG_PRE_RELOC,
11          };
```

从上面我们可以看到声明他们的时候对它们做了如下要求：

1.要求它们存放的时候4字节对齐，这通常是为了更方便的访问处理它们；
2.要求它们存放在一个各自独有的段里面

在链接脚本arch/arm/cpu/u-boot.lds中有如下定义:

```
1 . = ALIGN(4);
2             .u_boot_list : {
3             KEEP(*(SORT(.u_boot_list*)));
4       }
```

所有以.u_boot_list开头的段多将在这里存放,KEEP关键字是为了保证所有的段多被加进来，不要被链接器自作聪明的把某些它认为没有的段舍弃;
用宏**U_BOOT_DRIVER**和U_BOOT_DEVICE声明的变量将被分配到自己一个特有的段下，在链接的时候被组织到一起,具体可以在uboot编译成功后生成的u-boot.map中查看到u_boot_list段的相关信息如下:

```
5468  .u_boot_list_2_driver_1
5469                  0x0000000043e4f610        0x0 drivers/built-in.o
5470  .u_boot_list_2_driver_2_exynos_dwmmc_drv
5471                  0x0000000043e4f610       0x44 drivers/built-in.o
5472                  0x0000000043e4f610            _u_boot_list_2_driver_2_exynos_dwmmc_drv
5473  .u_boot_list_2_driver_2_gpio_exynos
5474                  0x0000000043e4f654       0x44 drivers/gpio/built-in.o
5475                  0x0000000043e4f654            _u_boot_list_2_driver_2_gpio_exynos
5476  .u_boot_list_2_driver_2_i2c_generic_chip_drv
5477                  0x0000000043e4f698       0x44 drivers/i2c/built-in.o
5478                  0x0000000043e4f698            _u_boot_list_2_driver_2_i2c_generic_chip_drv
5479  .u_boot_list_2_driver_2_mmc
5480                  0x0000000043e4f6dc       0x44 drivers/built-in.o
5481                  0x0000000043e4f6dc            _u_boot_list_2_driver_2_mmc
5482  .u_boot_list_2_driver_2_mmc_blk
5483                  0x0000000043e4f720       0x44 drivers/built-in.o
5484                  0x0000000043e4f720            _u_boot_list_2_driver_2_mmc_blk
5485  .u_boot_list_2_driver_2_root_driver
5486                  0x0000000043e4f764       0x44 drivers/built-in.o
5487                  0x0000000043e4f764            _u_boot_list_2_driver_2_root_driver
5488  .u_boot_list_2_driver_2_s5p_sdhci_drv
5489                  0x0000000043e4f7a8       0x44 drivers/built-in.o
5490                  0x0000000043e4f7a8            _u_boot_list_2_driver_2_s5p_sdhci_drv
5491  .u_boot_list_2_driver_2_serial_s5p
5492                  0x0000000043e4f7ec       0x44 drivers/serial/built-in.o
5493                  0x0000000043e4f7ec            _u_boot_list_2_driver_2_serial_s5p
5494  .u_boot_list_2_driver_2_simple_bus_drv
5495                  0x0000000043e4f830       0x44 drivers/built-in.o
5496                  0x0000000043e4f830            _u_boot_list_2_driver_2_simple_bus_drv
5497  .u_boot_list_2_driver_2_spi_generic_drv
5498                  0x0000000043e4f874       0x44 drivers/spi/built-in.o
5499                  0x0000000043e4f874            _u_boot_list_2_driver_2_spi_generic_drv
5500  .u_boot_list_2_driver_3
5501                  0x0000000043e4f8b8        0x0 drivers/built-in.o
```

注意到u_boot_list_2_driver_1和u_boot_list_2_driver_3,这段地址范围内即为驱动函数列表集合

搞清楚这两个关键宏后下篇将具体分析uclass,uclass_driver,udevice,driver之间的关系