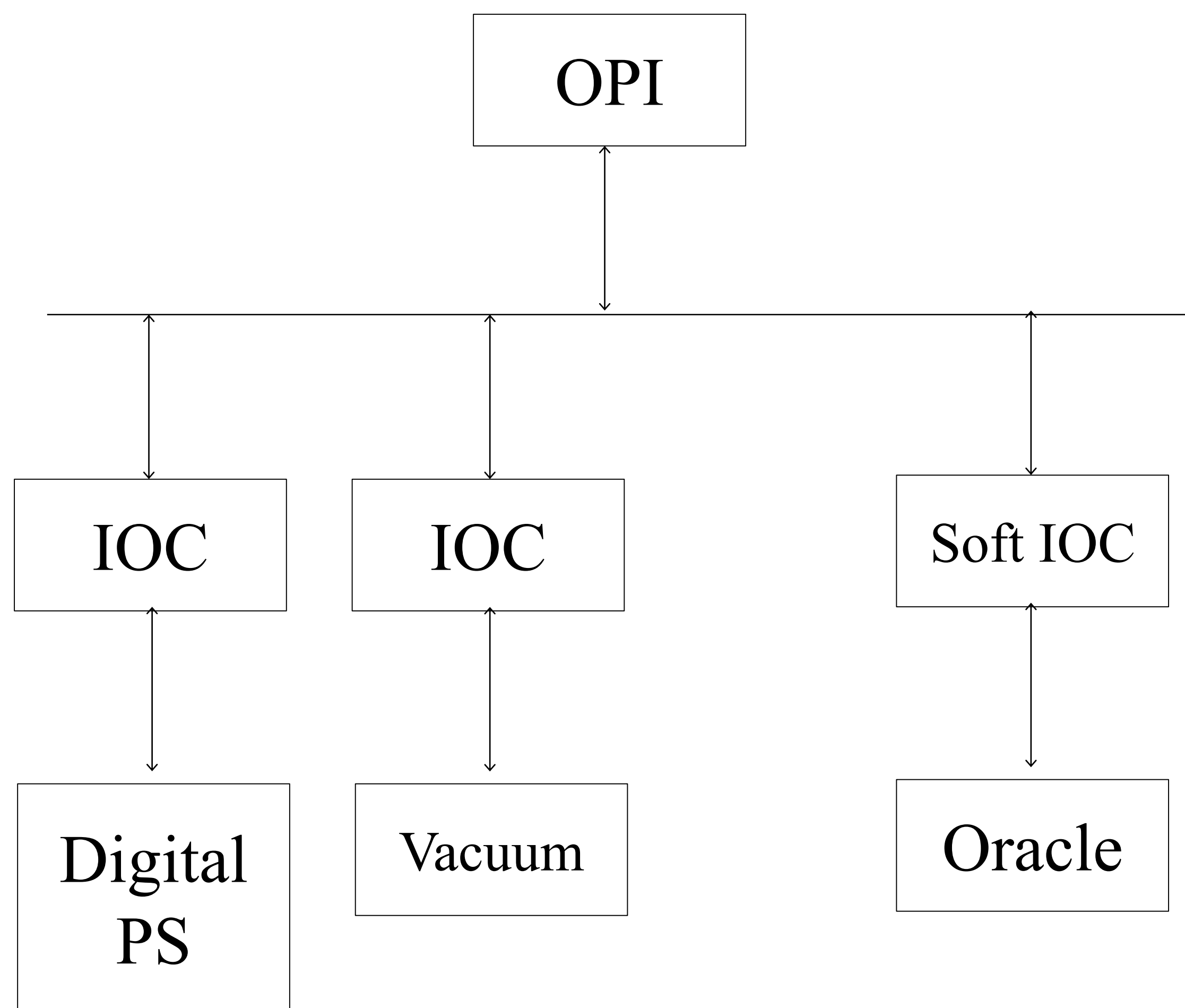


USE INTERRUPT DRIVEN MODE TO REDESIGN AN IOC FOR DIGITAL POWER SUPPLY AT SSC-LINAC

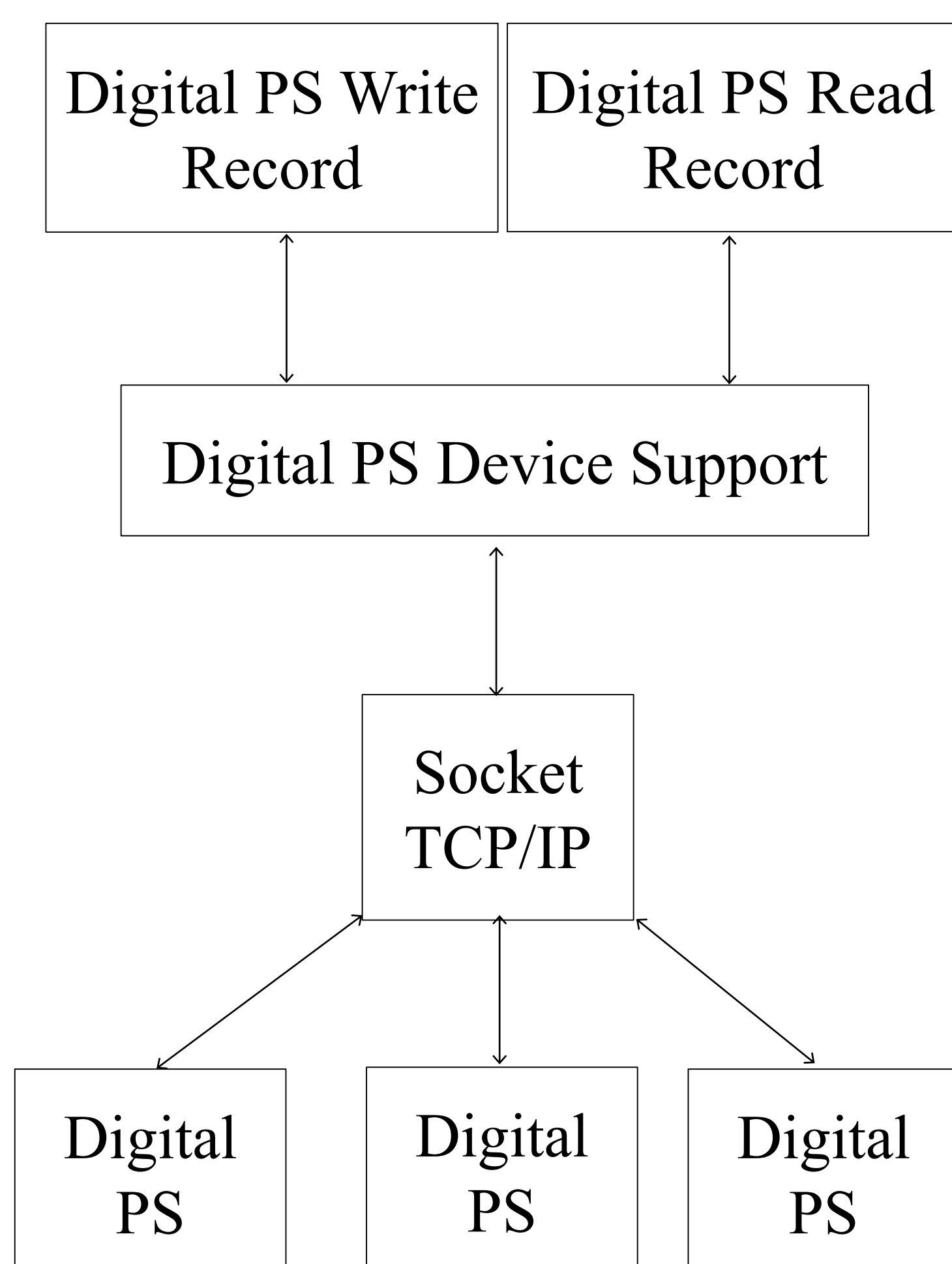
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SSC-LINAC Control System

SSC is a separated-sector cyclotron. To improve the efficiency of HIRFL, a linear accelerator is considered as a new injector for SSC of HIRFL. The SSC-LINAC control system is based on EPICS. There are many sub systems such as power supply control system, vacuum monitor system and so on.



Structure of the origin PS IOC



The bottom of the structure is digital PS. Above the PS is Ethernet interface and use TCP/IP as low level transfer protocol. In the middle layer is device support of EPICS architecture. The device support has two functions. First function is a periodic that sends a read command string to PS in every one second and receives current state of the PS. The second function is sends a write command string to PS. The top of the structure is record support.

Design a new device support for digital PS

First switch the Record periodic SCAN (“1 second”) to SCAN rate driven from a device specific source (“I/O Intr”). In our case separated thread for every one PS is used.

Second step is writing device support use interrupt model and implement in the following sections:

```

init
static long init(int phase)
{
    if(phase==0)
        initHookRegister(&start_ps_thread);
    return 0;
}
    
```

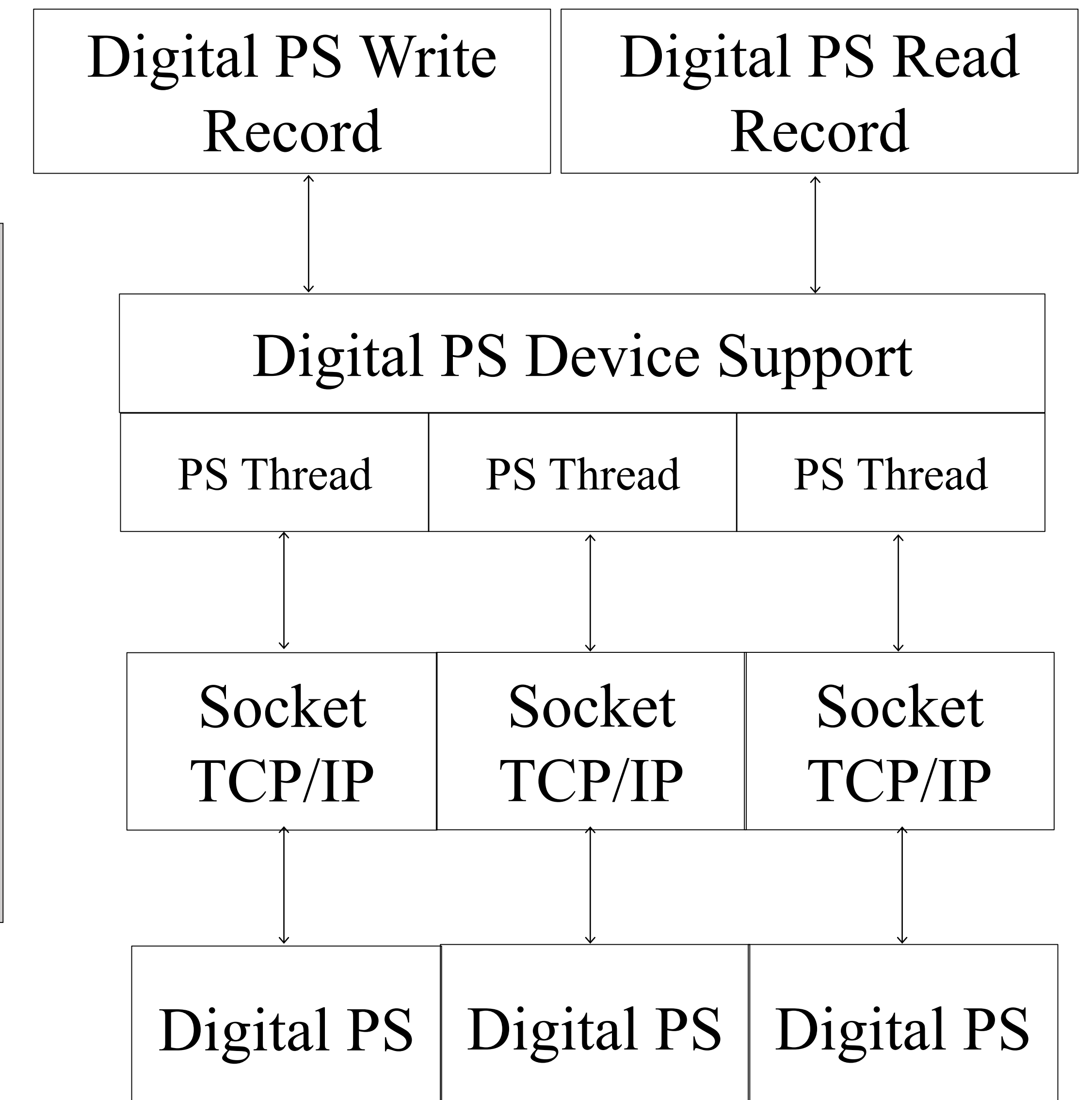
```

Init hook
static void start_ps_thread (initHookState state)
{
    .....
    priv->generator = epicsThreadMustCreate(
        "psThread",
        epicsThreadPriorityHigh,
        epicsThreadStackSize(epicsThreadStackSmall),
        &ps_thread, priv);
}
    
```

Digital PS thread

```

static void ps_thread(void* raw)
{
    .....
    //init socket
    int sockfd;
    struct sockaddr_in device_addr;
    .....
    //connect to PS
    .....
    while(1)
    {
        //send and receive something from the PS
        epicsMutexMustLock(priv->lock);
        //write useful data to record
        .....
        //queue a request
        scanIoRequest(priv->scan);
        epicsThreadSleep(interval);
    }
}
    
```



Conclusion

The origin structure of PS IOC uses periodic method. All processing is done on a single thread. So any digital PS connect block will cause the entire IOC to become unresponsive. New design uses separated thread to interact with every PS and results will push into record automatically. The new design solves the problem and make some new advantages. First advantage is what result from PS will more real-time send to record. Second advantage is more stability. One thread crash will not affect other thread. Whole system become more stability.