

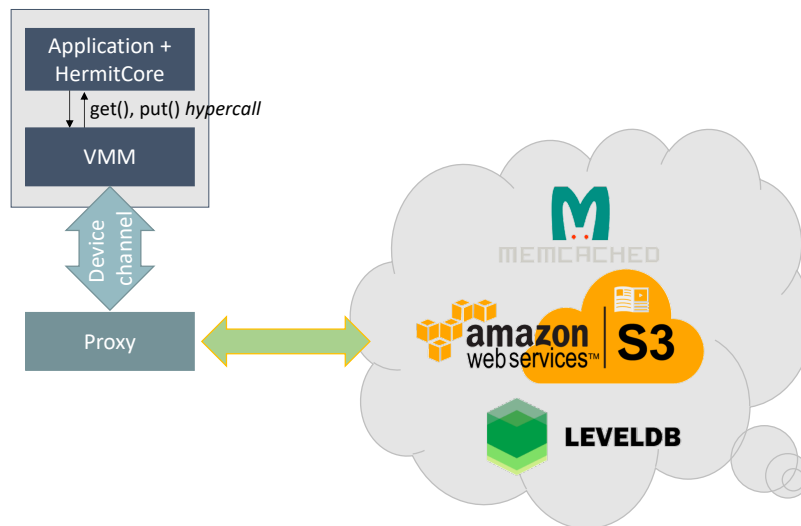
## Project 3: Split Device Driver and Clouds

### 1 Project Goal

- Implement a key-value store service for HermitCore using Amazon S3 and with split device driver model
- Applications access the KV store using services that the kernel provides
  - Service interface plays the frontend driver in the unikernel
- A proxy application communicates with AWS S3
  - Play the backend driver
- The hypervisor provides the device channel
  - Routes service requests/results between the application and the proxy

### 2 Specification

#### 2.1 Entities



#### Application

- Access the KV store service using defined APIs (i.e., function calls)
- Might be in-house benchmark applications, correctness checker, ...
- Will be multi-threaded, but only one application at a time

## HermitCore

- Convert the service request to hypercalls to uHyve
- Refer to `kernel/syscall.c`

## Hypervisor

- Use uHyve
- Route the hypercall requests to the proxy in `uhyve_send()` handler
- Can use whatever technology to communicate with the proxy
- Remember the application is multi-threaded
- The communication channel should be multi-thread safe

## Proxy

- Run at the local host
- Map key-value pairs in the requests to S3 objects
- Use C/C++/Java/Python/ASM whatever language you want
- May use Amazon SDK or REST API libraries
- Also, it's totally up to you which library you may use

## 2.2 APIs to implement

**`int put(char *key, void *value, size_t value_len)`**

- `key`: null-terminated string used as a key for the value.  $0 \leq |key| \leq 1024$ .
- `value`: buffer containing the value to store
- `value_len`:  $|value|$ .  $0 \leq value\_len \leq 4096$ . 0 means deletion, and value might be NULL in this case
- Should check the validity of parameters by yourself
- RETURN
  - 0 on success
  - -1 otherwise

**`int get(char *key, void *value, size_t *value_len)`**

- `key`: null-terminated string of key to get.  $0 \leq |key| \leq 1024$
- `value`: buffer to receive the result
- `*value_len`: size of the buffer
- RETURN
  - 0 when the item exists and stored in the buffer pointed by value with `*value_len` in size
  - -1 when item does not exist
  - -2 when buffer is too small

## 2.3 Notes

- Individual project to show your ability to the full
- Do whatever you want as long as it fits to the (underlying) goal of this project
  - Understand the split device driver model and taste cloud
- Be reasonable with your discretion
- If unsure, ask to the instructor or TA, always

## 3 Submit and Grading

- Due on May 4, Friday (hard deadline!!)
- Submit
  - Zipped source code
    - \* Modified HermitCore + your test application+proxy
    - \* Or URL to accessible git repository (preferred)
  - README.md
    - \* Describe system design principle and/or approach
- Grading
  - Design: 20
  - Correctness: 70
  - Performance: 10 (1st, 2nd in performance will get 10 and 8. Others get 6)