**Cache System LLD:**

**Components**:

Cache Manager
Cache
Eviction Policy

**Cache Manager:**

**Responsibilities:**
1. Manages cache operations.
2. Serves as an interface for the application.

**Methods:**
1. get(key: Key): Retrieves value for the given key.
2. put(key: Key, value: Value): Inserts or updates key-value pair.

**Cache**:
**Responsibilities**:
1. Stores key-value pairs.
2. Implements eviction policies.

**Attributes**:
1. cache: Map to store key-value pairs.
2. evictionPolicy: Pointer to the selected eviction policy.
3. capacity: Maximum capacity of the cache.
4. mtx: Mutex for thread safety.

**Methods**:
1. get(key: Key): Retrieves value for the given key.
2. put(key: Key, value: Value): Inserts or updates key-value pair.
3. createEvictionPolicy(policyType: EvictionPolicyType): Creates an instance of the selected eviction policy.

**Eviction Policy:**
**Responsibilities**:
1. Defines eviction strategies.
2. Manages eviction based on the selected strategy.

**Attributes**:
1. capacity: Maximum capacity of the cache.

**Methods**:
1. onGet(key: Key): Handles operations when getting a key.
2. onPut(key: Key, value: Value): Handles operations when putting a key-value pair.
3. onEvict(): Handles eviction of items from the cache.
4. evict(): Key: Performs eviction and returns the evicted key.

**Sequence**:
Application requests data from Cache Manager.

Cache Manager interacts with Cache.
Cache retrieves data or fetches it from the data source if not found.
Fetched data is stored in the cache.
Cache returns the data to the Cache Manager.
Cache Manager returns the data to the Application.
This detailed LLD provides a clear structure of the cache system, including the
responsibilities and interactions of each component.
**In brief:**

## CacheManager

- get(key: Key)
- put(key: Key, value: Value)

## Cache

- cache: Map<Key, Value>
- evictionPolicy: EvictionPolicy
- capacity: size_t
- mtx: Mutex
- get(key: Key)
- put(key: Key, value: Value)
- createEvictionPolicy(policyType: EvictionPolicyType): SharedPtr<EvictionPolicy>

## EvictionPolicy

- capacity: size_t
- onGet(key: Key)
- onPut(key: Key, value: Value)
- onEvict()
- evict(): Key