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Department of Computer Engineering

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- **Page Replacement Policies**

```c
#include <stdio.h>
#include <stdbool.h>

#define MAX_FRAMES 3

// Structure to represent a page in memory
typedef struct {
    int page_number;
    int last_used; // Timestamp to track when the page was last used
    bool valid;
} Page;

// Function to find the least recently used page
int findLRU(Page frames[], int num_frames) {
    int lru_index = 0;
    for (int i = 1; i < num_frames; ++i) {
        if (frames[i].last_used < frames[lru_index].last_used) {
            lru_index = i;
        }
    }
    return lru_index;
}

// Function to simulate page replacement using LRU policy
void LRU(int pages[], int num_pages) {
    Page frames[MAX_FRAMES];
    int page_faults = 0;

    for (int i = 0; i < num_pages; ++i) {
        bool page_found = false;
        // Check if page is already in memory
        for (int j = 0; j < MAX_FRAMES; ++j) {
            if (frames[j].valid && frames[j].page_number == pages[i]) {
                frames[j].last_used = i; // Update timestamp
                page_found = true;
                break;
            }
        }
        // If page not found in memory, perform page replacement
        if (!page_found) {
            int lru_index = findLRU(frames, MAX_FRAMES);
            frames[lru_index].page_number = pages[i];
            frames[lru_index].last_used = i;
            frames[lru_index].valid = true;
            page_faults++;
        }
    }

    printf("Number of page faults using LRU: %d\n", page_faults);
```
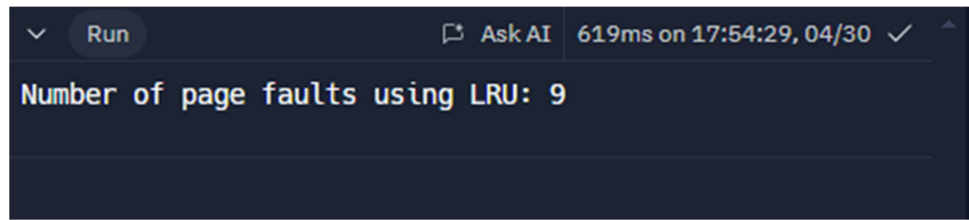
```
}

int main() {
    int pages[] = {0, 1, 2, 3, 2, 4, 5, 3, 4}; // Sample page reference string
    int num_pages = sizeof(pages) / sizeof(pages[0]);

    LRU(pages, num_pages);

    return 0;
}
```

Number of page faults using LRU: 9