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```
package pageReplacement;

        import java.io.IOException;
        import java.util.*;
        public class PageReplacement {
        public static void main(String []args) throws IOException{
           int a;
           int i=1;
           Scanner input=new Scanner(System.in);
           while(i==1){
              System.out.println("***Page Replacement Menu***");
              System.out.println("1.FIFO");
              System.out.println("2.LRU");
              System.out.println("3.OPTIMAL");
              System.out.println("4.EXIT");
              System.out.println("ENTER YOUR CHOICE:");
              a=input.nextInt();
           switch(a){
           case 1:{
              new fifo();
              break;
           }
           case 2:{
              new lru();
              break;
           }
           case 3:{
                                 new optimal();
              break;
           }
           case 4:{
              System.out.println("PAGE REPLACEMENT CLOSED");
              i=0;
              break;
           }
           default:{
              System.out.flush();
              System.err.println("Enter the correct input");
              break;
           }
           }
           }

        }
}
```

```
package pageReplacement;

import java.io.BufferedReader;
import java.io.IOException;
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import java.io.InputStreamReader;

public class fifo {
	int n, page[], f, frames[], faults, count;
	double rate;
	BufferedReader input = new BufferedReader(new
InputStreamReader(System.in));

	fifo() throws IOException {
		System.out.println("Enter number of pages");
		n = Integer.parseInt(input.readLine());
		page = new int[n];
		System.out.println("Enter number of page frames");
		f = Integer.parseInt(input.readLine());
		frames = new int[f];
		count = 1;
		read();
		call_fifo();
	}

	public void reset() {
		int j;
		for (j = 0; j < f; j++)
			frames[j] = -1;
		faults = 0;
		count = 1;
	}

	public void read() throws IOException {
		int i;
		System.out.println("Enter the pages");
		for (i = 0; i < n; i++) {
			System.out.println("Enter page number " + (i + 1));
			page[i] = Integer.parseInt(input.readLine());
		}
		for (i = 0; i < f; i++)
			frames[i] = -1;
	}

	public void call_fifo() {
		int i, j, k = 0;
		reset();
		boolean found = false;
		for (i = 0; i < n; i++) {
			for (j = 0; j < f; j++) {
				if (page[i] == frames[j])
					found = true;
			}
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                if (found == false) {
                        frames[k] = page[i];
                        if (k == f - 1)
                                k = 0;
                        else
                                k++;
                        faults++;

                }
                display();
                found = false;
        }
        System.out.println("Number of page faults = " + faults);
    }

    void display() {
        int i;
        System.out.print("Page frame " + count + " :");
        for (i = 0; i < f; i++) {
                if (frames[i] == -1)
                        System.out.print("-1");
                else
                        System.out.print(" " + frames[i]);
        }
        System.out.print("\n");
        count++;
    }
}


package pageReplacement;

import java.util.*;

public class lru {
    int frm[], indfrm;
    int p[], indp, i, j, fs[], indfs, n;
    int index, k, l, flag1 = 0, flag2 = 0, pf = 0, frsize;
    Scanner input = new Scanner(System.in);

    lru() {
        call_lru();
    }

    public void disp() {
        int i;
        System.out.println();
        for (i = 0; i < 3; i++)
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            System.out.println("\t" + frm[i]);
}

public void call_lru() {
      System.out.println("Enter the frame size");
      indfrm = input.nextInt();
      frsize = indfrm;
      System.out.println("Enter the number of pages");
      n = input.nextInt();
      p = new int[n];
      frm = new int[indfrm];
      fs = new int[indfrm];
      System.out.println("Enter the page number");
      for (i = 0; i < n; i++) {
            p[i] = input.nextInt();
      }
      for (i = 0; i < indfrm; i++) {
            frm[i] = -1;
      }
      for (j = 0; j < n; j++) {
            flag1 = 0;
            flag2 = 0;
            for (i = 0; i < indfrm; i++) {
                  if (frm[i] == p[j]) {
                        flag1 = 1;
                        flag2 = 1;
                        break;
                  }
            }
            if (flag1 == 0) {
                  for (i = 0; i < indfrm; i++) {
                        if (frm[i] == -1) {
                              frm[i] = p[j];
                              flag2 = 1;
                              break;
                        }
                  }
            }
            if (flag2 == 0) {
                  for (i = 0; i < indfrm; i++) {
                        fs[i] = 0;
                  }
                  for (k = j - 1, l = 1; l <= frsize - 1; l++, k--) {
                        for (i = 0; i < indfrm; i++) {
                              if (frm[i] == p[k]) {
                                    fs[i] = 1;
                              }
                        }
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                        }
                        for (i = 0; i < indfrm; i++) {
                              if (fs[i] == 0)
                                    index = i;
                        }
                        frm[index] = p[j];
                        pf++;
                  }
                  disp();
            }
            System.out.println();
            System.out.println("number of page faults: " + pf);
      }
}


package pageReplacement;

import java.util.*;

public class optimal {
      int n, page[], f, frames[], faults, count;
      double rate;
      Scanner input = new Scanner(System.in);

      optimal() {
            System.out.println("Enter number of pages");
            n = input.nextInt();
            page = new int[n];
            System.out.println("Enter number of page frames");
            f = input.nextInt();
            frames = new int[f];
            count = 1;
            int i;
            System.out.println("Enter the pages");
            for (i = 0; i < n; i++) {
                  System.out.println("Enter page number " + (i + 1));
                  page[i] = input.nextInt();
            }
            for (i = 0; i < f; i++)
                  frames[i] = -1;
            call_opt();
      }

      public void display() {
            int i;
            System.out.print("Page frame " + count + " :");
            for (i = 0; i < f; i++) {
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                if (frames[i] == -1)
                        System.out.print(" -");
                else
                        System.out.print(" " + frames[i]);
        }
        System.out.print("\n");
        count++;
}

public void reset() {
        int j;
        for (j = 0; j < f; j++)
                frames[j] = 0;
        faults = 0;
        count = 1;
}

public void call_opt() {
        int i, j = 0, k, duration[], max, flag[];
        reset();
        duration = new int[f];
        flag = new int[f];
        boolean found = false;

        for (i = 0; i < n; i++) {
                for (j = 0; j < f; j++) {
                        flag[j] = 0;
                        duration[j] = n;
                }

                for (k = i + 1; k < n; k++) {
                        for (j = 0; j < f; j++)
                                if (page[k] == frames[j] && flag[j] == 0) {
                                        duration[j] = k;
                                        flag[j] = 1;
                                }
                }

                for (j = 0; j < f; j++)
                        if (page[i] == frames[j])
                                found = true;
                if (found == false) {
                        max = 0;
                        for (j = 0; j < f; j++) {
                                if (duration[j] > duration[max])
                                        max = j;
                                if (frames[j] < 0) {
                                        max = j;
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                                    break;
                                }
                            }
                            frames[max] = page[i];
                            faults++;
                        }

                        display();
                        found = false;

                    }
                    System.out.println("Number of page faults = "+faults);
                }
            }
```