NAMA : HIZKIA ELSADANTA
NIM : 2341720253
KELAS : TI-1G
MATERI : SEARCHING

Percobaan 1

Langkah 1-13

```java
package P7;

public class Buku15 {
    int bookCode, stock, publicationYear;
    String bookTitle, author;

    Buku15(int bc, String bt, int py, String au, int st) {
        bookCode = bc;
        bookTitle = bt;
        publicationYear = py;
        author = au;
        stock = st;
    }

    void displayBookData() {
        System.out.println("==================================");
        System.out.println("Book code \t\t : " + bookCode);
        System.out.println("Book title \t\t : " + bookTitle);
        System.out.println("Publication year \t : " + publicationYear);
        System.out.println("Author \t\t\t : " + author);
        System.out.println("Stock \t\t\t : " + stock);
    }

}

```

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```java
package P7;

public class PencarianBuku15 {
    Buku15 listBk[] = new Buku15[5];
    int idx;

    void add(Buku15 m) {
        if (idx < listBk.length) {
            listBk[idx] = m;
            idx++;
        } else {
            System.out.println("The dataset is complete");
        }
    }

    void display() {
        for (Buku15 m : listBk) {
            m.displayBookData();
        }
    }

    int findSeqSearch(int search) {
        int position = -1;
        for (int i = 0; i < listBk.length; i++) {
            if (listBk[i].bookCode == search) {
                position = i;
                break;
            }
        }
        return position;
    }

    void displayPosition(int x, int pos) {
        if (pos != -1) {
            System.out.println("data : " + x + " is found at indeks " + pos);
        } else {
            System.out.println("data " + x + " not found");
        }
    }

}

```

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```java
package P7;

import java.util.Scanner;

public class BukuMain15 {
    public static void main(String[] args) {

        Scanner kiak = new Scanner(System.in);

        PencarianBuku15 data = new PencarianBuku15();
        int numOfBooks = 5;

        System.out.println("==========================================================================");
        System.out.println("Please input the book data in ascending order based on the book code : ");
        for (int i = 0; i < numOfBooks; i++) {
            System.out.println("================================");
            System.out.print("Book code \t\t : ");
            int bookCode = kiak.nextInt();
            kiak.nextLine();
            System.out.print("Book title \t\t : ");
            String bookTitle = kiak.nextLine();
            System.out.print("Publication year \t : ");
            int publicationYear = kiak.nextInt();
            kiak.nextLine();
            System.out.print("Author \t\t\t : ");
            String author = kiak.nextLine();
            System.out.print("Stock \t\t\t : ");
            int stock = kiak.nextInt();

            Buku15 m = new Buku15(bookCode, bookTitle, publicationYear, author, stock);
            data.add(m);
        }

        System.out.println("==========================================");
        System.out.println("The complete dataset of the book : ");
        data.display();

        System.out.println("==========================================");
        System.out.println("==========================================");
        System.out.println("Data search");
        System.out.println("Provide the book code you are searching for : ");
        System.out.print("Book code : ");
        int search = kiak.nextInt();
        System.out.println("Using sequential search");
        int posisi = data.findSeqSearch(search);
        data.displayPosition(search, posisi);

        kiak.close();

    }
}

```

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```
==========================================================================
Please input the book data in ascending order based on the book code :
================================
Book code               : 111
Book title              : algoritma
Publication year        : 2019
Author                  : wahyuni
Stock                   : 5
================================
Book code               : 123
Book title              : big data
Publication year        : 2020
Author                  : susilo
Stock                   : 3
================================
Book code               : 125
Book title              : desain ui
Publication year        : 2021
Author                  : supriadi
Stock                   : 3
================================
Book code               : 126
Book title              : web programming
Publication year        : 2022
Author                  : pustaka adi
Stock                   : 2
================================
Book code               : 127
Book title              : etika mahasiswa
Publication year        : 2023
Author                  : dermawan adi
Stock                   : 2
```

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```
==========================================
The complete dataset of the book :
==================================
Book code               : 111
Book title              : algoritma
Publication year        : 2019
Author                  : wahyuni
Stock                   : 5
==================================
Book code               : 123
Book title              : big data
Publication year        : 2020
Author                  : susilo
Stock                   : 3
==================================
Book code               : 125
Book title              : desain ui
Publication year        : 2021
Author                  : supriadi
Stock                   : 3
==================================
Book code               : 126
Book title              : web programming
Publication year        : 2022
Author                  : pustaka adi
Stock                   : 2
==================================
Book code               : 127
Book title              : etika mahasiswa
Publication year        : 2023
Author                  : dermawan adi
Stock                   : 2
==========================================
==========================================
```

```
==========================================
==========================================
Data search
Provide the book code you are searching for :
Book code : 111
Using sequential search
data : 111 is found at indeks 0
```

Langkah 14-16

```
void displayData(int x, int pos) {
        if (pos != -1) {
            System.out.println("Book code \t\t : " + x);
            System.out.println("Book title \t\t : " + listBk[pos].bookTitle);
            System.out.println("Publication year \t : " + listBk[pos].publicationYear);
            System.out.println("Author \t\t\t : " + listBk[pos].author);
            System.out.println("Stock \t\t\t : " + listBk[pos].stock);
        } else {
            System.out.println("data " + x + " not found");
        }
    }
```

```
data.displayData(search, posisi);
```

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```
Data search
Provide the book code you are searching for :
Book code : 111
Using sequential search
data : 111 is found at indeks 0
Book code               : 111
Book title              : Algoritma
Publication year        : 2019
Author                  : Wahyudi
Stock                   : 5
```

```
Data search
Provide the book code you are searching for :
Book code : 124
Using sequential search
data 124 not found
data 124 not found
```

1. Jelaskan fungsi break yang ada pada method FindSeqSearch!

   Jawab : Fungsi break untuk mengakhiri perulangan for begitu nilai dari listBk[i].bookCode sama dengan nilai search yang dicari. Tanpa adanya break, perulangan for akan terus berjalan hingga akhir meskipun nilai yang dicari sudah ditemukan. Dengan menggunakan break, perulangan akan langsung dihentikan begitu nilai yang dicari ditemukan, menghindari iterasi yang tidak diperlukan dan meningkatkan efisiensi program.

2. Jika Data Kode Buku yang dimasukkan tidak terurut dari kecil ke besar. Apakah program masih dapat berjalan? Apakah hasil yang dikeluarkan benar? Tunjukkan hasil screenshoot untuk bukti dengan kode Buku yang acak. Jelaskan Mengapa hal tersebut bisa terjadi?

   Jawab : Iya, program masih dapat berjalan, dan hasil yang dikeluarkan benar. Karena program menggunakan looping untuk mencari kode buku hingga kode buku ditemukan.

```
=========================================
The complete dataset of the book :
================================
Book code               : 111
Book title              : Algoritma
Publication year        : 2021
Author                  : Wahyuni
Stock                   : 5
================================
Book code               : 125
Book title              : Desain UI
Publication year        : 2021
Author                  : Supriadi
Stock                   : 3
================================
Book code               : 127
Book title              : Etika Mahasiswa
Publication year        : 2023
Author                  : Dermawan Adi
Stock                   : 2
================================
Book code               : 123
Book title              : Big Data
Publication year        : 2020
Author                  : Susilo
Stock                   : 3
================================
Book code               : 126
Book title              : Web Programming
Publication year        : 2022
Author                  : Pustaka Adi
Stock                   : 2
=========================================
=========================================
```

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```
Data search
Provide the book code you are searching for :
Book code : 123
Using sequential search
data : 123 is found at indeks 3
Book code               : 123
Book title              : Big Data
Publication year        : 2020
Author                  : Susilo
Stock                   : 3
```

3. Buat method baru dengan nama FindBuku menggunakan konsep sequential search dengan tipe method dari FindBuku adalah BukuNoAbsen. Sehingga Anda bisa memanggil method tersebut pada class BukuMain seperti gambar berikut :

```
Buku dataBuku = data.FindBuku(cari);
dataBuku.tampilDataBuku();
```

Jawab :

```
Buku15 FindBuku(int cari) {
    for (int i = 0; i < listBk.length; i++) {
        if (listBk[i].bookCode == cari) {
            return listBk[i];
        }
    }
    return listBk[-1];
}
```

```
Buku15 dataBook = data.FindBuku(posisi);
dataBook.displayBookData();
```

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Percobaan 2

```
System.out.println("==========================================");
        System.out.println("==========================================");
        System.out.println("Using binary search");
        posisi = data.findBinarySearch(search, 0, numOfBooks-1);
        data.displayPosition(search, posisi);
        data.displayData(search, posisi);
```

```
int findBinarySearch(int search, int left, int right) {
        int mid;
        if (right >= left) {
            mid = (right + left) / 2;
            if (search == listBk[mid].bookCode) {
                return (mid);
            } else if (listBk[mid].bookCode > search){
                return findBinarySearch(search, left, mid - 1);
            } else {
                return findBinarySearch(search, mid + 1, right);
            }
        }
        return -1;
    }
```

```
Provide the book code you are searching for :
Book code : 126
Using sequential search
data : 126 is found at indeks 3
Book code               : 126
Book title              : web programming
Publication year        : 2022
Author                  : pustaka adi
Stock                   : 2
==========================================
==========================================
Using binary search
data : 126 is found at indeks 3
Book code               : 126
Book title              : web programming
Publication year        : 2022
Author                  : pustaka adi
Stock                   : 2
```

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Pertanyaan

1. Tunjukkan pada kode program yang mana proses divide dijalankan!

   Jawab :
   ```
   mid = (right + left) / 2;
   ```

2. Tunjukkan pada kode program yang mana proses conquer dijalankan!

   Jawab :

   ```
   } else if (listBk[mid].bookCode > search){
       return findBinarySearch(search, left, mid - 1);
   } else {
       return findBinarySearch(search, mid + 1, right);
   }
   ```

3. Jika data Kode Buku yang dimasukkan tidak urut. Apakah program masih dapat berjalan? Mengapa demikian! Tunjukkan hasil screenshoot untuk bukti dengan kode Buku yang acak. Jelaskan Mengapa hal tersebut bisa terjadi?

   Jawab : Program masih dapat berjalan akan tetapi hasil yang dikeluarkan salah, karena dalam kode program tersebut tidak terdapat kode yang menunjukkan pengurutan data, sedangkan pencarian biner hanya berfungsi dengan benar jika data sudah dalam urutan terurut.

```
============================================================
Please input the book data in ascending order based on the book code :
================================
Book code               : 125
Book title              : desain ui
Publication year        : 2021
Author                  : supriadi
Stock                   : 3
================================
Book code               : 111
Book title              : algoritma
Publication year        : 2019
Author                  : wahyuni
Stock                   : 5
================================
Book code               : 127
Book title              : etika mahasiswa
Publication year        : 2023
Author                  : dermawan adi
Stock                   : 2
================================
Book code               : 126
Book title              : web programming
Publication year        : 2022
Author                  : pustaka adi
Stock                   : 2
================================
Book code               : 123
Book title              : big data
Publication year        : 2020
Author                  : susilo
Stock                   : 3
========================================
```

```
==========================================
==========================================
Data search
Provide the book code you are searching for :
Book code : 126
Using sequential search
data : 126 is found at indeks 3
Book code               : 126
Book title              : web programming
Publication year        : 2022
Author                  : pustaka adi
Stock                   : 2
==========================================
==========================================
Using binary search
data 126 not found
data 126 not found
```

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4. Jika Kode Buku yang dimasukkan dari Kode Buku terbesar ke terkecil (missal : 20215, 20214, 20212, 20211, 20210) dan elemen yang dicari adalah 20210. Bagaimana hasil dari binary search? Apakah sesuai? Jika tidak sesuai maka ubahlah kode program binary seach agar hasilnya sesuai!

Jawab :

```
} else if (listBk[mid].bookCode < search){
```

```
==========================================================================
Please input the book data in ascending order based on the book code :
==================================
Book code               : 20215
Book title              : Asd
Publication year        : 2020
Author                  : Kia
Stock                   : 4
==================================
Book code               : 20214
Book title              : Basdat
Publication year        : 2021
Author                  : Khen
Stock                   : 4
==================================
Book code               : 20212
Book title              : Matdas
Publication year        : 2022
Author                  : Yass
Stock                   : 3
==================================
Book code               : 20211
Book title              : Aljabar
Publication year        : 2020
Author                  : Elsa
Stock                   : 2
==================================
Book code               : 20210
Book title              : Algoritma
Publication year        : 2019
Author                  : Bu vivi
Stock                   : 3
==========================================
```

```
==========================================
==========================================
Data search
Provide the book code you are searching for :
Book code : 20210
Using sequential search
data : 20210 is found at indeks 4
Book code               : 20210
Book title              : Algoritma
Publication year        : 2019
Author                  : Bu vivi
Stock                   : 3
==========================================
==========================================
Using binary search
data : 20210 is found at indeks 4
Book code               : 20210
Book title              : Algoritma
Publication year        : 2019
Author                  : Bu vivi
Stock                   : 3
```

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Latihan Praktikum

1. Modifikasi percobaan searching diatas dengan ketentuan berikut ini
   - Ubah tipe data dari kode Buku yang awalnya int menjadi String
   - Tambahkan method untuk pencarian kode Buku (bertipe data String) dengan menggunakan sequential search dan binary search

   Jawab :

```
int findSeq(int search) {
    int position = -1;
    for (int i = 0; i < listBk.length; i++) {
        // Integer.parseInt untuk mengkonversi String menjadi int
        int bookCode2 = Integer.parseInt(listBk[i].bookCode);
        if (bookCode2 == search) {
            position = i;
            break;
        }
    }
    return position;
}
```

```
int findBin(int search, int left, int right) {
    int mid;
    if (right >= left) {
        mid = (right + left) / 2;
        // integer.paraseInt untuk mengkonversi dari String ke int
        int comResult = Integer.parseInt(listBk[mid].bookCode);
        if (comResult == search) {
            return mid;
        } else if (comResult > search ) {
            return findBin(search, left, mid - 1);
        } else {
            return findBin(search, mid + 1, right);
        }
    }
    return -1;
}
```

```
System.out.println(x:"Data search");
System.out.println(x:"Provide the book code you are searching for : ");
System.out.print(s:"Book code : ");
int search = kiak.nextInt();
System.out.println(x:"Using sequential search");
// int posisi = data.findSeqSearch(search);
int posisi = data.findSeq(search);
data.displayPosition(search, posisi);
data.displayData(search, posisi);

// Buku15 dataBook = data.FindBuku(search);
// dataBook.displayBookData();

System.out.println(x:"==========================================");
System.out.println(x:"==========================================");
System.out.println(x:"Using binary search");
// posisi = data.findBinarySearch(search, 0, numOfBooks-1);
posisi = data.findBin(search, left:0, numOfBooks-1);
data.displayPosition(search, posisi);
data.displayData(search, posisi);

kiak.close();
```

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2. Modifikasi percobaan searching diatas dengan ketentuan berikut ini Algoritma dan Struktur Data 2023-2024 Tim Ajar Algoritma dan Struktur Data 2023-2024 Jurusan Teknologi Informasi-Politeknik Negeri Malang
   - Tambahkan method pencarian judul buku menggunakan sequential search dan binary search. Sebelum dilakukan searching dengan binary search data harus dilakukan pengurutan dengan menggunakan algoritma Sorting (bebas pilih algoritma sorting apapun)! Sehingga ketika input data acak, maka algoritma searching akan tetap berjalan
   - Buat aturan untuk mendeteksi hasil pencarian judul buku yang lebih dari 1 hasil dalam bentuk kalimat peringatan! Pastikan algoritma yang diterapkan sesuai dengan kasus yang diberikan!

   Jawab :

```
void display() {
    bubbleSort();
    for (Buku15 m : listBk) {
        m.displayBookData();
    }
}
```

```
// SEARCH FOR BOOKS BY THE TITLE.
int seqBookTitle(String search) {
    int position = -1;
    for (int i = 0; i < listBk.length; i++) {
        if (listBk[i].bookTitle.equals(search)) {
            return position = i;
        }
    }
    return position;
}
```

```
int binBookTitle(String search, int left, int right) {
    int mid;
    if (right >= left) {
        mid = (right + left) / 2;
        int result = search.compareTo(listBk[mid].bookTitle);
        if (result == 0) {
            return mid;

        } else if (result < 0) {
            return binBookTitle(search, left, mid - 1);
        } else {
            return binBookTitle(search, mid + 1, right);
        }
    }
    return -1;
}
```

```
void displayPosition(String x, int pos) {
    if (pos != -1) {
        System.out.println("data : " + x + " is found at indeks " + pos);
    } else {
        System.out.println("data " + x + " not found");
    }
}
```

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```
void displayData(String x, int pos) {
    if (pos != -1) {
        System.out.println("Book code \t\t : " + listBk[pos].bookCode);
        System.out.println("Book title \t\t : " + listBk[pos].bookTitle);
        System.out.println("Publication year \t : " + listBk[pos].publicationYear);
        System.out.println("Author \t\t\t : " + listBk[pos].author);
        System.out.println("Stock \t\t\t : " + listBk[pos].stock);
    } else {
        System.out.println("data " + x + " not found");
    }
}
```

```
// ORGANIZE THE BOOK COLLECTION ACCORDING TO THE BOOK CODE.
void bubbleSort() {
    for (int i = 0; i < listBk.length - 1; i++) {
        for (int j = 1; j < listBk.length - i; j++) {
            if (listBk[j].bookCode.compareTo(listBk[j - 1].bookCode) < 0) {
                Buku15 tmp = listBk[j];
                listBk[j] = listBk[j - 1];
                listBk[j - 1] = tmp;
            }
        }
    }
}
```

```
System.out.println(x:"==========================================");
System.out.println(x:"==========================================");
System.out.println(x:"Data search");
System.out.println(x:"Provide the book code you are searching for : ");
System.out.print(s:"Book title : ");
String title = kiak.nextLine();

System.out.println(x:"Using sequential search");
int position = data.seqBookTitle(title);
data.displayPosition(title, position);
data.displayData(title, position);

System.out.println(x:"Using binary search");
position = data.binBookTitle(title, left:0, numOfBooks-1);
data.displayPosition(title, position);
data.displayData(title, position);
```

Input secara acak

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KELAS : TI-1G
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```
================================
Book code               : 123
Book title              : big data
Publication year        : 2020
Author                  : susilo
Stock                   : 3
================================
Book code               : 111
Book title              : algoritma
Publication year        : 2019
Author                  : wahyuni
Stock                   : 5
================================
Book code               : 126
Book title              : web programming
Publication year        : 2022
Author                  : pustaka adi
Stock                   : 2
================================
Book code               : 125
Book title              : desain ui
Publication year        : 2021
Author                  : supriadi
Stock                   : 3
================================
Book code               : 127
Book title              : etika mahasiswa
Publication year        : 2023
Author                  : dermawan adi
Stock                   : 2
================================================
```

Sudah diurutkan secara ascending

```
================================================
The complete dataset of the book :
================================
Book code               : 111
Book title              : algoritma
Publication year        : 2019
Author                  : wahyuni
Stock                   : 5
================================
Book code               : 123
Book title              : big data
Publication year        : 2020
Author                  : susilo
Stock                   : 3
================================
Book code               : 125
Book title              : desain ui
Publication year        : 2021
Author                  : supriadi
Stock                   : 3
================================
Book code               : 126
Book title              : web programming
Publication year        : 2022
Author                  : pustaka adi
Stock                   : 2
================================
Book code               : 127
Book title              : etika mahasiswa
Publication year        : 2023
Author                  : dermawan adi
Stock                   : 2
================================================
================================================
```

output

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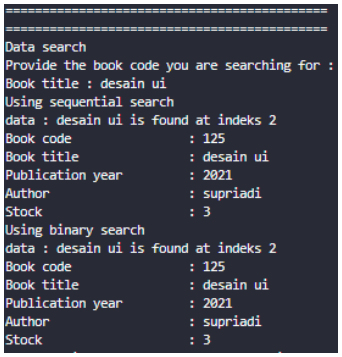

Link github

https://github.com/Kiaakk/Algoritma_Struktur_Data_1G_15.git