2. File access

> Method used to physically find a record in a file

Sequential access

> A method of file access in which records are searched one after another from the physical start of the file until the required record is found, or a new record can be added to the file. This method is used for `serial` and `sequential` files.

- High hit rate
  For a `serial` file, if a particular record is being searched for, every record needs to be checked until the record is found or the whole file has been searched and that record has not been found. Any new records are appended to the end of the file.

For a `sequential` file, if a particular records is being searched for, every records needs to be checked until the record is found or *the key filed of the current record being checked is greater than the key field of the record being searched for*. The rest of the file does not need to be searched as the records are sorted on ascending key field values.

Sequential access if efficient when **every** record in the file needs to be processed. e.g. a monthly billing or payroll system.

Direct access

> A method of file access in which a record can be physically found in a file without reading other records.

- Both `sequential` and `random` files can use direct access.
- Allow specific records to be found more quickly than using sequential access.
- Low hit rate

Direct access is required when an **individual** record from a file needs to be processed. e.g. when a single customer record needs to be updated when the customer’s phone number is changed.

For a `sequential` file, an index of all the key fields is kept and used to look up the address of the file location where a given record is stored. For large files, searching the index takes less time than searching the whole file.

A separate index file is created which has two fields per record. The first record has the key field value and the second filed has a value for the position of this key field value in the main file.

For a `random access` file, a hashing algorithm is used on the key filed to calculate the address of the file location where a given record is stored.