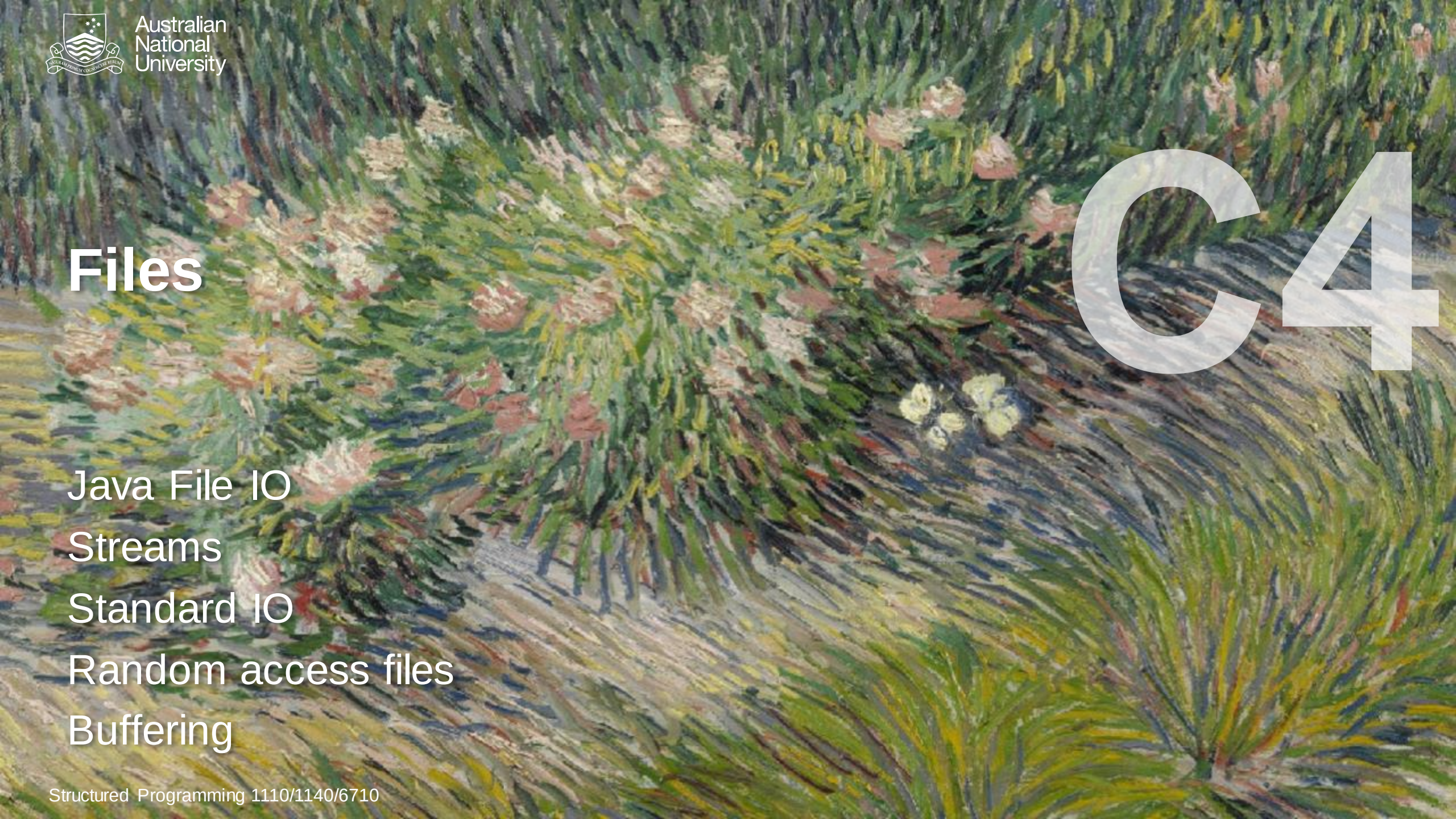
Australian
National
University
C4
Files
Java File IO
Streams
Standard IO
Random access files
Buffering
Structured Programming 1110/1140/6710

File IO as Streams

A **stream** is a standard abstraction used for files:

A sequence of values are read.

A sequence of values are written.

The stream reflects the sequential nature of file IO and the physical characteristics of the media on which files traditionally reside (e.g. tape or a spinning disk).


A
maxoll
maxell
UR
90
POSITION NORMAL


TDK
DATA CARTRIDGE
DC-6250
Cartouche Numérique
FUJIFILM
DG4-150

Java File I/O: Byte Streams

The classes FileInputStream and FileOutputStream allow you to read and write streams of bytes to and from files.

- Open the stream
- Read or write from the stream (in **byte**s)
- Wrap operations in a **try** clause
- Use **finally** to close the streams

ints are used, even though **byte**s are transferred(!)

Java File I/O: Character Streams

When reading and writing characters, you should use the classes FileReader and FileWriter, which allow you to read and write streams of characters to and from files.

ints are used, even though **char**s are transferred.

File I/O: Buffering

Reading data one byte at a time is costly. Buffering is used to absorb some of that overhead.

Disk: ~10ms RAM: ~100ns Register: ~1ns

In Java the `BufferedReader` and `BufferedWriter` classes can be used to buffer data read or written with `FileReader` and `FileWriter`.

To be sure that a buffer is flushed, call `flush()` or close the file.

Java Command Line IO

Three standard IO streams (auto defined objects):

- Standard input System.in
- Standard output System.out
- Standard error System.err

```
byte b = (byte) System.in.read();
System.out.write(b);
System.out.flush();
System.err.write(b);
```

“New” I/O (java.nio.file)

Java NIO offers simpler, event-driven interface

- Path — replaces java.io.File
- FileSystem — factory class that for objects in the filesystem
- WatchService — utility class to detect file system changes through event notification
- Files —create, rename, copy, modify attributes and delete files