# Abstraction in Programming – Outline and Notes

## 1️⃣ What is Abstraction?

Abstraction means showing only the essential features of something and hiding unnecessary details. It helps focus on what an object does rather than how it does it.

Everyday Example: When you drive a car, you use the pedals and steering wheel without needing to know how the engine works.

## 2️⃣ Why We Use Abstraction (Purpose)

|  |  |
| --- | --- |
| Benefit | Description |
| Simplicity | Hides complex internal logic behind clear method names. |
| Reusability | Lets you reuse working code in other projects. |
| Readability | Others can understand what the code does quickly. |
| Safety | Prevents external code from breaking internal data. |
| Focus | You only see what’s relevant to your task. |

## 3️⃣ How to Apply Abstraction in C#

Step 1: Create Classes – Define objects that represent real ideas like Video or Comment.

Step 2: Use Access Modifiers – Control visibility using private, public, or protected.

Step 3: Use Methods to Expose Behavior – Provide public methods that do actions safely.

Step 4: Create a Clear Interface – Focus on what can be done, not how it’s done.

Step 5: Hide Data Using Private Fields – Protect internal data from direct modification.

Step 6: Separate Responsibilities – Each class has one clear job.

## 4️⃣ Abstraction Checklist

* ✅ Each class focuses on one responsibility.
* ✅ Internal data is private or protected.
* ✅ Public methods define a simple interface.
* ✅ No unnecessary details are exposed.
* ✅ Code is readable and well organized.
* ✅ Constructors initialize and protect data.
* ✅ You can use the class without knowing its internals.

## 5️⃣ Example Summary for Your Project

|  |  |
| --- | --- |
| Concept | Example in Your Code |
| Hidden details | \_comments and \_keywords are private |
| Simple interface | AddComment(), AddKeyword(), MatchesKeyword() |
| One clear responsibility | Video tracks videos; Comment tracks feedback |
| Focus on what, not how | MatchesKeyword() tells you if a word matches |
| Real-world modeling | Video represents a real video object |

## 6️⃣ Visual Summary Diagram (Simple)

Program  
│  
├── uses → Video  
│ ├── title, author, length  
│ ├── manages → comments, keywords  
│ └── hides details (private lists)  
│  
└── uses → Comment  
 ├── author, text  
 └── hides details behind properties