Objective

Build a self-hosted ASP.NET Core web application that takes a catalog category hierarchy as input, sends each subcategory to the OpenAI API, and outputs the three most relevant product attributes for every subcategory.

Requirements

1. Input

The application should accept a JSON structure representing categories. Here is an example of the category structure:

```JSON
[
    {
        "categoryName": "TVs",
        "subCategories": [
            {
                "categoryId": 80,
                "categoryName": "TVs"
            },
            {
                "categoryId": 948,
                "categoryName": "All-Weather TVs"
            },
            {
                "categoryId": 37,
                "categoryName": "TV Accessories"
            }
        ]
    },
    {
        "categoryName": "Projectors & Screens",
        "subCategories": [
            {
                "categoryId": 62,
                "categoryName": "Projectors"
            },
            {
                "categoryId": 30,
```

```
                "categoryName": "Projector Screens"
            },
            {
                "categoryId": 83,
                "categoryName": "Projector Lenses"
            },
            {
                "categoryId": 35,
                "categoryName": "Projector Accessories"
            },
            {
                "categoryId": 1201,
                "categoryName": "Screen Accessories"
            }
        ]
    },
    {
        "categoryName": "Mounting Brackets",
        "subCategories": [
            {
                "categoryId": 126,
                "categoryName": "TV Mounts & Brackets"
            },
            {
                "categoryId": 91,
                "categoryName": "Motorized Lifts"
            },
            {
                "categoryId": 102,
                "categoryName": "Projector Brackets"
            },
            {
                "categoryId": 793,
                "categoryName": "Speaker Mounts"
            },
            {
                "categoryId": 1203,
                "categoryName": "Mounting Bracket Accessories"
            },
            {
                "categoryId": 1628,
                "categoryName": "Tablet Brackets"
            }
        ]
```

```
},
{
    "categoryName": "Receivers & Amps",
    "subCategories": [
        {
            "categoryId": 105,
            "categoryName": "Receivers"
        },
        {
            "categoryId": 40,
            "categoryName": "Amplifiers"
        },
        {
            "categoryId": 101,
            "categoryName": "Preamps & Processors"
        },
        {
            "categoryId": 1198,
            "categoryName": "Receiver & Amp Accessories"
        }
    ]
},
{
    "categoryName": "Speakers",
    "subCategories": [
        {
            "categoryId": 115,
            "categoryName": "Sound Bars & Bases"
        },
        {
            "categoryId": 120,
            "categoryName": "Subwoofers"
        },
        {
            "categoryId": 74,
            "categoryName": "In-Ceiling"
        },
        {
            "categoryId": 75,
            "categoryName": "In-Wall"
        },
        {
            "categoryId": 94,
            "categoryName": "Outdoor"
```

```
            },
            {
                "categoryId": 48,
                "categoryName": "Bookshelf & On-Wall"
            },
            {
                "categoryId": 70,
                "categoryName": "Floorstanding"
            }
        ]
    },
    {
        "categoryName": "A/V Sources & Media Players",
        "subCategories": [
            {
                "categoryId": 766,
                "categoryName": "Media Players"
            },
            {
                "categoryId": 45,
                "categoryName": "Docking Stations"
            },
            {
                "categoryId": 131,
                "categoryName": "Blu-Ray Players"
            },
            {
                "categoryId": 765,
                "categoryName": "DVD Players"
            },
            {
                "categoryId": 1704,
                "categoryName": "Mobile Devices"
            },
            {
                "categoryId": 767,
                "categoryName": "Gaming Systems"
            },
            {
                "categoryId": 768,
                "categoryName": "CD Players"
            },
            {
                "categoryId": 769,
```

```
            "categoryName": "Turntables"
        }
    ]
},
{
    "categoryName": "Control",
    "subCategories": [
        {
            "categoryId": 106,
            "categoryName": "Handheld Remotes"
        },
        {
            "categoryId": 55,
            "categoryName": "Climate Control"
        },
        {
            "categoryId": 79,
            "categoryName": "Keypads"
        },
        {
            "categoryId": 125,
            "categoryName": "Touchscreens"
        },
        {
            "categoryId": 59,
            "categoryName": "Controllers"
        },
        {
            "categoryId": 794,
            "categoryName": "Base Stations, Repeaters, & Gateways"
        },
        {
            "categoryId": 1648,
            "categoryName": "Contacts, Relays & Sensors"
        }
    ]
},
{
    "categoryName": "Lighting",
    "subCategories": [
        {
            "categoryId": 84,
            "categoryName": "Dimmers & Switches"
        },
```

```
            {
                "categoryId": 1712,
                "categoryName": "Keypads"
            },
            {
                "categoryId": 1713,
                "categoryName": "Panelized Lighting"
            },
            {
                "categoryId": 1714,
                "categoryName": "Color Change Kits"
            },
            {
                "categoryId": 1721,
                "categoryName": "Light Strips"
            },
            {
                "categoryId": 1722,
                "categoryName": "Bulbs & Lamps"
            }
        ]
    },
    {
        "categoryName": "Networking",
        "subCategories": [
            {
                "categoryId": 1698,
                "categoryName": "Routers, Gateways, & Firewalls"
            },
            {
                "categoryId": 107,
                "categoryName": "Switches"
            },
            {
                "categoryId": 138,
                "categoryName": "Wireless Hardware"
            },
            {
                "categoryId": 1571,
                "categoryName": "Wireless Antennas"
            },
            {
                "categoryId": 1699,
                "categoryName": "Cellular Boosters"
```

```
            }
        ]
    },
    {
        "categoryName": "Signal Distribution",
        "subCategories": [
            {
                "categoryId": 44,
                "categoryName": "Baluns & Extenders"
            },
            {
                "categoryId": 2045,
                "categoryName": "AVoIP"
            },
            {
                "categoryId": 87,
                "categoryName": "Switchers"
            },
            {
                "categoryId": 111,
                "categoryName": "Signal Converters"
            },
            {
                "categoryId": 1770,
                "categoryName": "Encoders & Decoders"
            },
            {
                "categoryId": 1568,
                "categoryName": "Splitters & Dist Amps"
            }
        ]
    },
    {
        "categoryName": "Multi-Room Audio",
        "subCategories": [
            {
                "categoryId": 92,
                "categoryName": "Keypads & Components"
            },
            {
                "categoryId": 132,
                "categoryName": "Volume Controls"
            },
            {
```

```
                "categoryId": 1275,
                "categoryName": "Speaker Switchers"
            },
            {
                "categoryId": 1709,
                "categoryName": "Packages"
            },
            {
                "categoryId": 1755,
                "categoryName": "Controllers"
            },
            {
                "categoryId": 1276,
                "categoryName": "Multi-Room Audio Accessories"
            },
            {
                "categoryId": 1776,
                "categoryName": "Software & Licenses"
            }
        ]
    }
]
```


2. Processing

For each category:

- Build a prompt requesting the three most popular product attributes.

- Make a direct API call to the **OpenAI API**.

- Parse the response and extract attributes.

- Produce a final JSON output.

Required behaviors:

- Validate JSON formatting and return useful error messages.

- Handle API failures gracefully.

- Ensure attribute extraction is clean and consistent.

3. Output

Return JSON in the following format:

```JSON
[
  {
    "categoryId": 80,
    “attributes”: ["attribute1", "attribute2", "attribute3"]
  },
  {
    "categoryId": 948,
    “attributes”: ["attribute4", "attribute5", "attribute6"]
  },
  …
]
```

4. Web UI

Create any web-based UI (not Swagger-based) that:

- Provides a text area for JSON input.

- Has a button to generate attributes.

- Displays output JSON.

Deliverables

1. Source Code

A complete, runnable ASP.NET Core project with a clear structure.
Suggested structure (not mandatory, but encouraged):

```
None
/src
  /CategoryAttributeGenerator           ← main application project
  /CategoryAttributeGenerator.Tests     ← optional tests
/README.md
```

Requirements:

- Must build and run with dotnet run
- No missing files, configs, or settings (except for OpenAI key)
- The project should be cleanly organized (folders for Controllers, Services, Models, etc.)

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2. README File

Your README must clearly describe:

How to Run the Application

- Required .NET SDK version (any version you used)
- Step-by-step instructions:
    - install dependencies
    - set environment variables
    - run the project
    - access the UI