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**sphinx-mcp**

*Release 0.1.2*

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sphinx-mcp is a [Sphinx](https://www.sphinx-doc.org/)<sup>1</sup> documentation extension for Model Context Protocol (MCP) servers. In this documentation, you will find information on how to install, configure, and use the extension to document MCP servers. You will also find examples of how to use the extension with different MCP servers, such as [pymcp](https://github.com/anirbanbasu/pymcp)<sup>2</sup> and [@modelcontextprotocol/server-everything](https://github.com/modelcontextprotocol/servers/tree/main/src/everything)<sup>3</sup>.

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<sup>1</sup> <https://www.sphinx-doc.org/>

<sup>2</sup> <https://github.com/anirbanbasu/pymcp>

<sup>3</sup> <https://github.com/modelcontextprotocol/servers/tree/main/src/everything>



## CHAPTER

# 1

## USAGE

This section covers the installation, configuration and usage of the `sphinx-mcp` extension for Sphinx.

### 1.1 Installation

You can install `sphinx-mcp` using `pip` as `pip install sphinx-mcp`. Alternatively, you can add it to your existing project a project management tool, such as `uv`<sup>4</sup>, by calling `uv add sphinx-mcp`. Once installed, you can use it in your Sphinx project by adding it to the `extensions` list in your Sphinx `conf.py` file and add the MCP servers configuration, as shown below.

### 1.2 Configuration

To document only one MCP server, you can set the `allow_only_one_mcp_server` configuration option to `True` (it defaults to `False` if not specified).

```
extensions = [
    "sphinx_mcp",
]

mcp_config = {
    "mcpServers": {
        "pymcp": {
            "transport": "stdio",
            "command": "python",
            "args": ["-m", "pymcp.server"],
        }
    }
}

allow_only_one_mcp_server = True
```

To document multiple MCP servers, you can specify them in the `mcpServers` dictionary. Remember to set the `allow_only_one_mcp_server` to `False` or not set it at all, as it defaults to `False`. In the fol-

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<sup>4</sup> <https://docs.astral.sh/uv/>

lowing example, two MCP servers are configured: one using the `pymcp` library and another using the `@modelcontextprotocol/server-everything` package, which is not even implemented in Python!

```
extensions = [
    "sphinx_mcp",
]

mcp_config = {
    "mcpServers": {
        "pymcp": {
            # Local stdio server
            "transport": "stdio",
            "command": "python",
            "args": ["-m", "pymcp.server"],
        },
        "everything": {
            # Make sure to run `npm use --lts` before running this.
            "command": "npx",
            "args": ["-y", "@modelcontextprotocol/server-everything"],
        }
    }
}
```

In both the single and multiple server configurations, only `stdio` transport is illustrated. However, servers with `sse` and `streamable-http` transports can also be configured. For `stdio` transport, the command necessary to run the server must execute successfully as Sphinx will use it to connect to the server. This necessitates having the necessary runtime environment set up, such as having the correct Python version or Node.js version installed.

## 1.3 Directives

The extension provides the following directives to document MCP servers. Each directive belongs to the domain `mcpdocs`.

`mcpdocs::tools`

This directive is used to document the tools available in one or more MCP servers. An optional argument can be provided to specify the MCP server to document. If no argument is provided, it defaults to all the servers configured in the `mcp_config` dictionary. If the argument is absent, each tool listed will be prefixed with the server name, followed by two colons, e.g., `pymcp::greet`.

### Arguments:

- server name (optional)

`mcpdocs::prompts`

This directive is used to document the prompts available in one or more MCP servers. Similar to the tools directive, an optional argument can be provided to specify the MCP server to document. If no argument is provided, it defaults to all the servers configured in the `mcp_config` dictionary. If the argument is absent, each prompt listed will be prefixed with the server name, followed by two colons, e.g., `pymcp::code_prompt`.

### Arguments:

- server name (optional)

`mcpdocs::resources`

This directive is used to document the resources available in one or more MCP servers. An optional argument can be provided to specify the MCP server to document. If no argument is provided, it defaults to all the servers configured in the `mcp_config` dictionary. If the argument



is absent, each resource listed will be prefixed with the server name, followed by two colons, e.g., `pymcp:resource_logo`.

**Arguments:**

- server name (optional)

**mcpdocs:resource\_templates**

This directive is used to document the resource templates available in one or more MCP servers. An optional argument can be provided to specify the MCP server to document. If no argument is provided, it defaults to all the servers configured in the `mcp_config` dictionary. If the argument is absent, each resource template listed will be prefixed with the server name, followed by two colons, e.g., `pymcp:resource_unicode_modulo10`.

**Arguments:**

- server name (optional)

## 1.4 Limitations

The extension currently only has the aforementioned directives. It does not contain any roles yet. In addition, the generation of indices for the documented tools, prompts, resources, and resource templates is not implemented yet.



## CHAPTER

# 2

## EXAMPLE MCP SERVER: PYMCP

`pymcp` is an open-source template repository for developing MCP servers in Python, using [FastMCP](https://github.com/anirbanbasu/fastmcp)<sup>5</sup>. The project is available on GitHub at [pymcp](https://github.com/anirbanbasu/pymcp)<sup>6</sup>.

### 2.1 Tools

1. **greet**: Greet the caller with a quintessential Hello World message.

Input schema:

```
{
  "properties": {
    "name": {
      "anyOf": [
        {
          "type": "string"
        },
        {
          "type": "null"
        }
      ],
      "default": null,
      "description": "The optional name to be greeted.",
      "title": "Name"
    }
  },
  "type": "object"
}
```

Output schema:

```
{
  "properties": {
```

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<sup>5</sup> [http://gofastmcp.com/](https://gofastmcp.com/)

<sup>6</sup> <https://github.com/anirbanbasu/pymcp>

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```

    "result": {
      "title": "Result",
      "type": "string"
    }
  },
  "required": [
    "result"
  ],
  "title": "_WrappedResult",
  "type": "object",
  "x-fastmcp-wrap-result": true
}

```

Annotations:

```

{
  "title": null,
  "readOnlyHint": true,
  "destructiveHint": null,
  "idempotentHint": null,
  "openWorldHint": null
}

```

Metadata:

```

{
  "_fastmcp": {
    "tags": [
      "example",
      "greeting"
    ]
  }
}

```

2. **generate\_password**: Generate a random password with specified length, optionally including special characters. The password will meet the complexity requirements of at least one lowercase letter, one uppercase letter, and two digits. If special characters are included, it will also contain at least one such character. Until the password meets these requirements, it will keep regenerating. This is a simple example of a tool that can be used to generate passwords. It is not intended for production use.

Input schema:

```

{
  "properties": {
    "length": {
      "default": 12,
      "description": "The length of the password to generate (between 8 and 64 ↵
↵characters).",
      "maximum": 64,
      "minimum": 8,
      "title": "Length",
      "type": "integer"
    },
    "use_special_chars": {
      "default": false,
      "description": "Include special characters in the password."
    }
  }
}

```

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```

    "title": "Use Special Chars",
    "type": "boolean"
  },
  "type": "object"
}

```

Output schema:

```

{
  "properties": {
    "result": {
      "title": "Result",
      "type": "string"
    }
  },
  "required": [
    "result"
  ],
  "title": "_WrappedResult",
  "type": "object",
  "x-fastmcp-wrap-result": true
}

```

Annotations:

```

{
  "title": null,
  "readOnlyHint": true,
  "destructiveHint": null,
  "idempotentHint": null,
  "openWorldHint": null
}

```

Metadata:

```

{
  "_fastmcp": {
    "tags": [
      "example",
      "password-generation"
    ]
  }
}

```

3. **text\_web\_search**: Perform a text web search using the provided query using DDGS.

Input schema:

```

{
  "properties": {
    "query": {
      "description": "The search query to fetch results for. It should be a non-  
→empty string.",
      "title": "Query",
      "type": "string"
    }
  },

```

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```

"region": {
  "anyOf": [
    {
      "type": "string"
    },
    {
      "type": "null"
    }
  ],
  "default": "uk-en",
  "description": "Optional region to search in.",
  "title": "Region"
},
"max_results": {
  "anyOf": [
    {
      "maximum": 100,
      "minimum": 1,
      "type": "integer"
    },
    {
      "type": "null"
    }
  ],
  "default": 10,
  "description": "The maximum number of results to return. Default is 10, ↵
↪maximum is 100.",
  "title": "Max Results"
},
"pages": {
  "anyOf": [
    {
      "maximum": 10,
      "minimum": 1,
      "type": "integer"
    },
    {
      "type": "null"
    }
  ],
  "default": 1,
  "description": "The number of pages to fetch. Default is 1, maximum is 10.
↪",
  "title": "Pages"
},
"required": [
  "query"
],
"type": "object"
}

```

Output schema:

null

Metadata:

```
{
  "_fastmcp": {
    "tags": [
      "meta-search",
      "searchexample",
      "text-search"
    ]
  }
}
```

4. **permutations:** Calculate the number of ways to choose  $k$  items from  $n$  items without repetition and with order. If  $k$  is not provided, it defaults to  $n$ .

Input schema:

```
{
  "properties": {
    "n": {
      "description": "The number of items to choose from.",
      "minimum": 1,
      "title": "N",
      "type": "integer"
    },
    "k": {
      "anyOf": [
        {
          "minimum": 1,
          "type": "integer"
        },
        {
          "type": "null"
        }
      ],
      "default": null,
      "description": "The optional number of items to choose.",
      "title": "K"
    }
  },
  "required": [
    "n"
  ],
  "type": "object"
}
```

Output schema:

```
{
  "properties": {
    "result": {
      "title": "Result",
      "type": "integer"
    }
  },
  "required": [
    "result"
  ],
  "title": "_WrappedResult",
  "type": "object",
}
```

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```
"x-fastmcp-wrap-result": true
}
```

Annotations:

```
{
  "title": null,
  "readOnlyHint": true,
  "destructiveHint": null,
  "idempotentHint": null,
  "openWorldHint": null
}
```

Metadata:

```
{
  "_fastmcp": {
    "tags": [
      "example",
      "math",
      "permutation"
    ]
  }
}
```

5. **pirate\_summary**: Summarise the given text in a pirate style. This is an example of a tool that can use LLM sampling to generate a summary.

Input schema:

```
{
  "properties": {
    "text": {
      "title": "Text",
      "type": "string"
    }
  },
  "required": [
    "text"
  ],
  "type": "object"
}
```

Output schema:

```
{
  "properties": {
    "result": {
      "title": "Result",
      "type": "string"
    }
  },
  "required": [
    "result"
  ],
  "title": "_WrappedResult",
  "type": "object",
}
```

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```
"x-fastmcp-wrap-result": true
}
```

Metadata:

```
{
  "_fastmcp": {
    "tags": [
      "example",
      "llm-sampling",
      "pirate-summary"
    ]
  }
}
```

6. **vonmises\_random**: Generate a random number from the von Mises distribution. This is an example of a tool that uses elicitation to obtain the required parameter kappa ( $\kappa$ ).

Input schema:

```
{
  "properties": {
    "mu": {
      "description": "The mean angle mu (\u03bc), expressed in radians between 0\u2192and 2\u03c0",
      "maximum": 6.283185307179586,
      "minimum": 0,
      "title": "Mu",
      "type": "number"
    }
  },
  "required": [
    "mu"
  ],
  "type": "object"
}
```

Output schema:

```
{
  "properties": {
    "result": {
      "title": "Result",
      "type": "number"
    }
  },
  "required": [
    "result"
  ],
  "title": "_WrappedResult",
  "type": "object",
  "x-fastmcp-wrap-result": true
}
```

Metadata:

```
{
  "_fastmcp": {
    "tags": [
      "elicitation",
      "example",
      "experimental"
    ]
  }
}
```

## 2.2 Prompts

1. **code\_prompt**: Get a prompt to write a code snippet in Python based on the specified task.

Input arguments:

```
[
  {
    "name": "task",
    "description": null,
    "required": true
  }
]
```

Metadata:

```
{
  "_fastmcp": {
    "tags": [
      "code-generation",
      "example"
    ]
  }
}
```

## 2.3 Resources

1. **resource\_logo** (data://logo) [application/json]: Get the base64 encoded PNG logo of PyMCP.



```
{
  "_fastmcp": {
    "tags": [
      "example",
      "logo",
      "png"
    ]
  }
}
```

2. **resource\_logo\_svg** (data://logo\_svg) [image/svg+xml]: Get the PyMCP logo as SVG.



```
{
  "_fastmcp": {
    "tags": [
      "example",
      "logo",
      "svg"
    ]
  }
}
```

## 2.4 Resource templates

1. **resource\_unicode\_modulo10**: Computes the modulus 10 of a given number and returns a Unicode character representing the result. The character is chosen based on whether the modulus is odd or even: - For odd modulus, it uses the Unicode character starting from ❶ (U+2776). - For even modulus, it uses the Unicode character starting from ① (U+2460). - If the modulus is 0, it returns the circled zero character ⓪ (U+24EA).

Metadata:

```
{
  "_fastmcp": {
    "tags": []
  }
}
```



## CHAPTER

# 3

## EXAMPLE MCP SERVER: EVERYTHING

**everything** is a **Model Context Protocol (MCP) server** that

attempts to exercise all the features of the MCP protocol. It is not intended to be a useful server, but rather a test server for builders of MCP clients. It implements prompts, tools, resources, sampling, and more to showcase MCP capabilities.

Source: [everything](https://github.com/modelcontextprotocol/servers/tree/main/src/everything)<sup>7</sup> as part of the official MCP examples on GitHub.

### 3.1 Tools

1. **echo**: Echoes back the input

Input schema:

```
{
  "type": "object",
  "properties": {
    "message": {
      "type": "string",
      "description": "Message to echo"
    }
  },
  "required": [
    "message"
  ],
  "additionalProperties": false,
  "$schema": "http://json-schema.org/draft-07/schema#"
}
```

Output schema:

```
null
```

2. **add**: Adds two numbers

Input schema:

---

<sup>7</sup> <https://github.com/modelcontextprotocol/servers/tree/main/src/everything>

```
{
  "type": "object",
  "properties": {
    "a": {
      "type": "number",
      "description": "First number"
    },
    "b": {
      "type": "number",
      "description": "Second number"
    }
  },
  "required": [
    "a",
    "b"
  ],
  "additionalProperties": false,
  "$schema": "http://json-schema.org/draft-07/schema#"
}
```

Output schema:

```
null
```

### 3. **longRunningOperation**: Demonstrates a long running operation with progress updates

Input schema:

```
{
  "type": "object",
  "properties": {
    "duration": {
      "type": "number",
      "default": 10,
      "description": "Duration of the operation in seconds"
    },
    "steps": {
      "type": "number",
      "default": 5,
      "description": "Number of steps in the operation"
    }
  },
  "additionalProperties": false,
  "$schema": "http://json-schema.org/draft-07/schema#"
}
```

Output schema:

```
null
```

### 4. **printEnv**: Prints all environment variables, helpful for debugging MCP server configuration

Input schema:

```
{
  "type": "object",
  "properties": {},
  "additionalProperties": false,
```

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```

"$schema": "http://json-schema.org/draft-07/schema#"
}

```

Output schema:

```

null

```

## 5. **sampleLLM**: Samples from an LLM using MCP's sampling feature

Input schema:

```

{
  "type": "object",
  "properties": {
    "prompt": {
      "type": "string",
      "description": "The prompt to send to the LLM"
    },
    "maxTokens": {
      "type": "number",
      "default": 100,
      "description": "Maximum number of tokens to generate"
    }
  },
  "required": [
    "prompt"
  ],
  "additionalProperties": false,
  "$schema": "http://json-schema.org/draft-07/schema#"
}

```

Output schema:

```

null

```

## 6. **getTinyImage**: Returns the MCP\_TINY\_IMAGE

Input schema:

```

{
  "type": "object",
  "properties": {},
  "additionalProperties": false,
  "$schema": "http://json-schema.org/draft-07/schema#"
}

```

Output schema:

```

null

```

## 7. **annotatedMessage**: Demonstrates how annotations can be used to provide metadata about content

Input schema:

```

{
  "type": "object",
  "properties": {
    "messageType": {

```

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```

    "type": "string",
    "enum": [
      "error",
      "success",
      "debug"
    ],
    "description": "Type of message to demonstrate different annotation",
    "patterns":
  },
  "includeImage": {
    "type": "boolean",
    "default": false,
    "description": "Whether to include an example image"
  }
},
"required": [
  "messageType"
],
"additionalProperties": false,
"$schema": "http://json-schema.org/draft-07/schema#"
}

```

Output schema:

null

8. **getResourceReference**: Returns a resource reference that can be used by MCP clients

Input schema:

```

{
  "type": "object",
  "properties": {
    "resourceId": {
      "type": "number",
      "minimum": 1,
      "maximum": 100,
      "description": "ID of the resource to reference (1-100)"
    }
  },
  "required": [
    "resourceId"
  ],
  "additionalProperties": false,
  "$schema": "http://json-schema.org/draft-07/schema#"
}

```

Output schema:

null

9. **startElicitation**: Demonstrates the Elicitation feature by asking the user to provide information about their favorite color, number, and pets.

Input schema:

```

{
  "type": "object",

```

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```

"properties": {},
"additionalProperties": false,
"$schema": "http://json-schema.org/draft-07/schema#"
}

```

Output schema:

```

null

```

10. **getResourceLinks**: Returns multiple resource links that reference different types of resources

Input schema:

```

{
  "type": "object",
  "properties": {
    "count": {
      "type": "number",
      "minimum": 1,
      "maximum": 10,
      "default": 3,
      "description": "Number of resource links to return (1-10)"
    }
  },
  "additionalProperties": false,
  "$schema": "http://json-schema.org/draft-07/schema#"
}

```

Output schema:

```

null

```

11. **structuredContent**: Returns structured content along with an output schema for client data validation

Input schema:

```

{
  "type": "object",
  "properties": {
    "location": {
      "type": "string",
      "minLength": 1,
      "description": "City name or zip code"
    }
  },
  "required": [
    "location"
  ],
  "additionalProperties": false,
  "$schema": "http://json-schema.org/draft-07/schema#"
}

```

Output schema:

```

{
  "type": "object",
  "properties": {

```

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```
"temperature": {
  "type": "number",
  "description": "Temperature in celsius"
},
"conditions": {
  "type": "string",
  "description": "Weather conditions description"
},
"humidity": {
  "type": "number",
  "description": "Humidity percentage"
}
},
"required": [
  "temperature",
  "conditions",
  "humidity"
],
"additionalProperties": false,
"$schema": "http://json-schema.org/draft-07/schema#"
}
```

## 3.2 Prompts

1. **simple\_prompt**: A prompt without arguments
2. **complex\_prompt**: A prompt with arguments

Input arguments:

```
[
  {
    "name": "temperature",
    "description": "Temperature setting",
    "required": true
  },
  {
    "name": "style",
    "description": "Output style",
    "required": false
  }
]
```

3. **resource\_prompt**: A prompt that includes an embedded resource reference

Input arguments:

```
[
  {
    "name": "resourceId",
    "description": "Resource ID to include (1-100)",
    "required": true
  }
]
```

### 3.3 Resources

1. **Resource 1** (test://static/resource/1) [text/plain]
2. **Resource 2** (test://static/resource/2) [application/octet-stream]
3. **Resource 3** (test://static/resource/3) [text/plain]
4. **Resource 4** (test://static/resource/4) [application/octet-stream]
5. **Resource 5** (test://static/resource/5) [text/plain]
6. **Resource 6** (test://static/resource/6) [application/octet-stream]
7. **Resource 7** (test://static/resource/7) [text/plain]
8. **Resource 8** (test://static/resource/8) [application/octet-stream]
9. **Resource 9** (test://static/resource/9) [text/plain]
10. **Resource 10** (test://static/resource/10) [application/octet-stream]

### 3.4 Resource templates

1. **Static Resource:** A static resource with a numeric ID