

# Building Rich AI-Native UI for Agentic Interactions Using MCP Apps

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SDE/Developer Advocate, AWS

Code + Tutorial



Link -

<https://dev.to/ashita/how-i-added-websocket-powered-realtime-streaming-to-mcp-apps-3oh6>

# MCP Apps

9:41

AI Companion

Plan a vegan dinner party for 4 next Saturday.

**SpiceAI Recipes**

<b>Butternut squash risotto</b>	<b>Lentil shepherd's pie</b>	<b>Berry crumble</b>
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**Ingredients**

- ✓ Butternut squash risotto
- ✓ 2 cop Lentil
- ✓ 2 cop seeds
- ✓ 2 tesy crumble
- ✓ Berry crumble
- ✓ 3 more

**Step ty by-step**

1. Plant cousemenu with butternut squash risotto, shepherd's pie, lentili.
2. Step-by-step instructions.
3. Prop a cours erstructions to tently, add the betterat and promme a cromia a berring needs.

Can I swap the dessert?

Ask anything

9:41

Find a new 2-bedroom apartment for rent under \$3500.

**NestSeeker Housing**

<b>\$39,000</b> 200 Ress Address Bunges UK 399	<b>\$35,000</b> 209 Ploor Plans St.. Ploorview	<b>\$12,000</b> 209 Narveaddack Bringes YA 320
--	--	--

Contact Agent

AI Companion

Compare the latest iPhone and a premium Android.

**TechCompare Shopping**

<b>Camera resolution</b>	420 HP resolution	32G BAM camera
<b>Battery life</b>	160 hours	300 hours
<b>Screen type</b>	21-18"	21-15"
<b>Screen type</b>	Wind 10s	Stanl Star
<b>Price</b>	\$6,990	\$12,000

Shop Now

9:41

AI Companion

Check Nvidia (NVDA) price history and market sentiment.

**MarketWatch Trading**

NVDA / NSRA 1133.67 1122.27 +21.66 (+0.40%)  
 Naving Average 38.65  
 Melgwaz Encck 136.23

166.00  
150.00  
140.00  
80.00

Mar May Jul Dec 2021

Sentiment  
Solcum Sodiah

**LocalBeat SF**

<b>Indie Concert at The Fillmore (8 PM)</b> Advoiry, at 9 PM Nat Fillimere	<b>Modern Art Gallery Opening (7 PM)</b> Modern Art Gallery Opening, 17 PM	<b>Stand-up Comedy Show (9 PM)</b> Stand-up-Com End Slecee
--	--	--

Get Tickets

AI Companion

Find a bike-friendly day trip near me for this weekend.

**PedalPath**

Curated 20 mil cycling itinerary View Details

10 mi  
10 mi  
0k 0 mi 10 mi 20 mi

What's a good approach to tech stock investing?

Ask anything

9:41

AI Companion

Teach me future tense French conjugation.

**LinguaLearn AI**

verb	Je	ne	aos
<b>être</b>	être	sera	serai
plural	plural	être	être

	Future tense			Interactive Quiz
Verb	es	an	s	Je serai? <input checked="" type="checkbox"/>
Future	es	abc	Ab	Je serai <input type="text"/>
Future tense	s+	Ab	Ab	

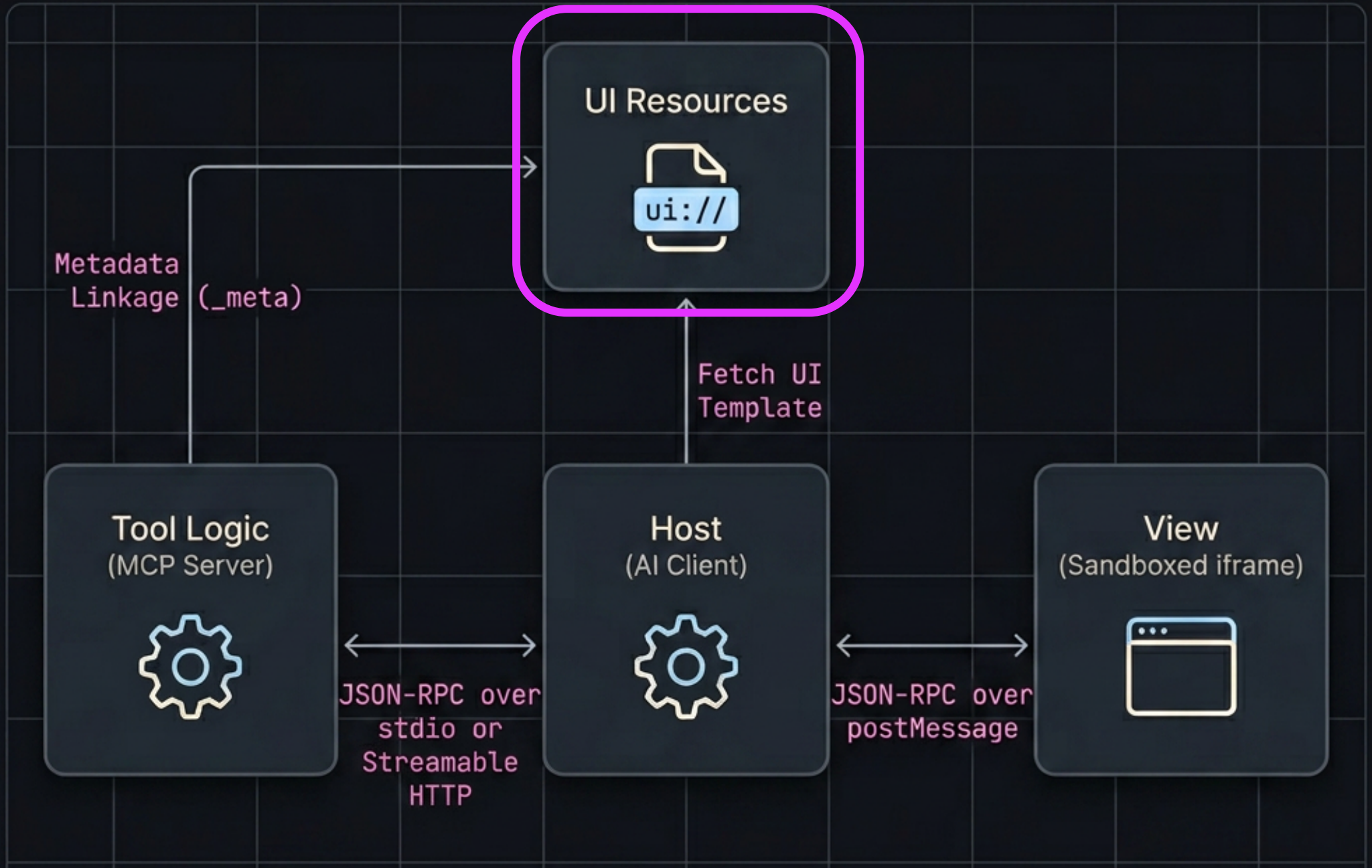
Je serai?

# Core Concepts



index.ts

```
1 import { McpServer } from "@modelcontextprotocol/sdk/server/mcp.js";
2 import { StdioServerTransport } from "@modelcontextprotocol/sdk/server/stdio.js";
3
4 const server = new McpServer({
5   name: "mcp-apps-spec-examples",
6   version: "1.0.0",
7 });
8
9 async function main() {
10   const transport = new StdioServerTransport();
11   await server.connect(transport);
12   console.error("🚀 MCP Apps server running (stdio)");
13 }
```



```
1 export function GREETING_HTML(): string {
2   return `<!DOCTYPE html>
3 <html lang="en"><head><meta charset="utf-8">
4 <title>Greeting</title>
5 <style>
6   .card { max-width: 500px; padding: 20px 22px;
7           border: 2px solid #e5e7eb;
8           border-radius: 12px; background: #ddf;
9           box-shadow: 0 1px 2px rgb(0 0 0 / 0.06); }
10  .text-secondary { color: #6b7280; margin: 0; }
11  .mt { margin-top: 10px; }
12 </style>
13 </head>
14 <body>
15   <div class="card">
16     <h1>👋 Hello from MCP Apps!</h1>
17     <p class="text-secondary">A static greeting with no interaction.</p>
18   </div>
19   <p id="status" class="text-secondary mt">Initializing...</p>
20 </body>
21 </html>`;
22 }
```

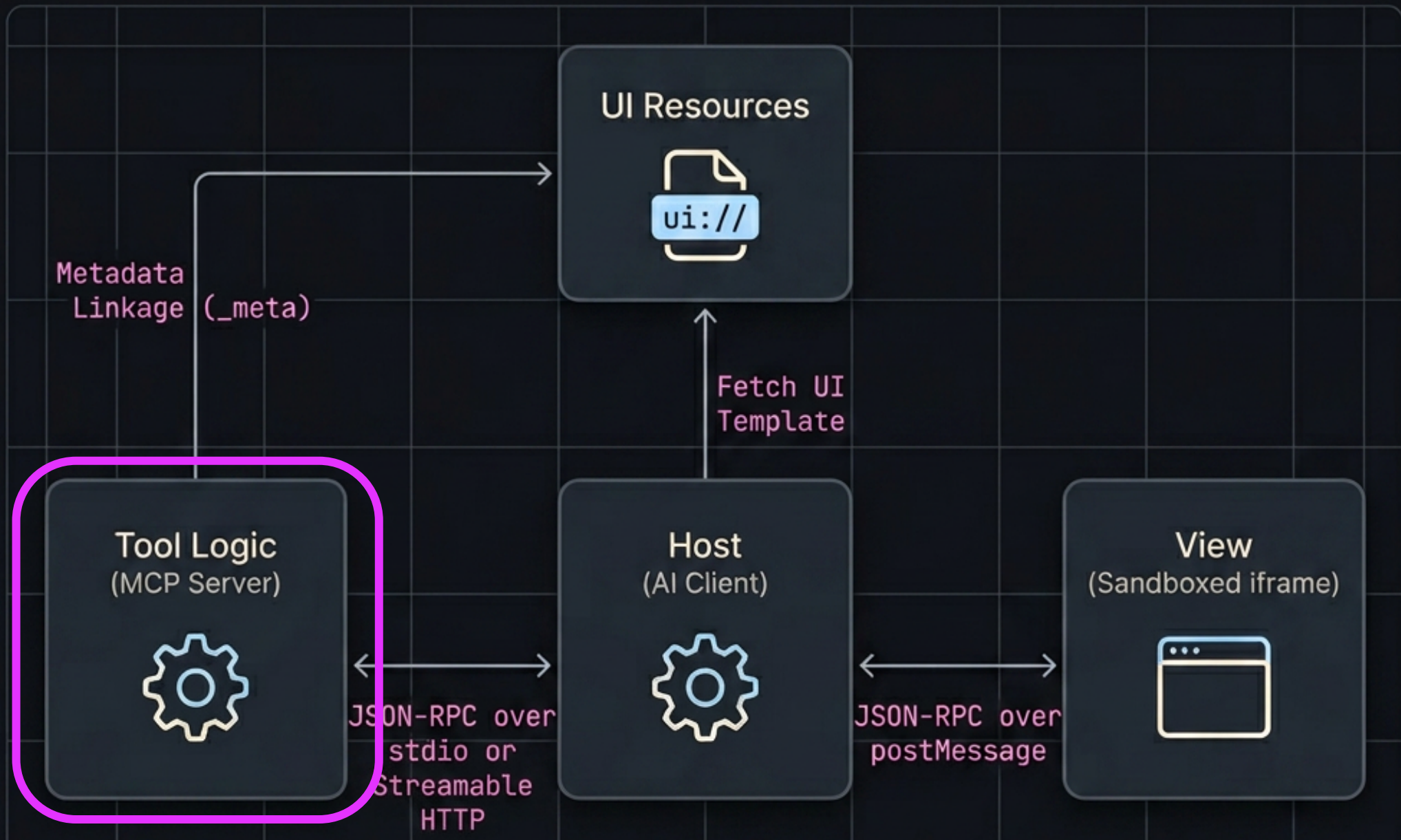
```
1 import { McpServer } from "@modelcontextprotocol/sdk/server/mcp.js";
2 import { StdioServerTransport } from "@modelcontextprotocol/sdk/server/stdio.js";
3 import { GREETING_HTML } from "../ui/greeting.js";
4
5 const MIME = "text/html;profile=mcp-app" as const;
6 const URI = "ui://mcp-apps-spec-examples";
7
8 const server = new McpServer({
9   name: "mcp-apps-spec-examples",
10  version: "1.0.0",
11 });
12
13 server.registerResource(
14   "greeting",
15   `${URI}/greeting`,
16   { mimeType: MIME, description: "A static greeting with no interaction." },
17   async (uri) => ({
18     contents: [{ uri: uri.href, mimeType: MIME, text: GREETING_HTML() }],
19   }),
20 );
```





Pre-declared resource URI





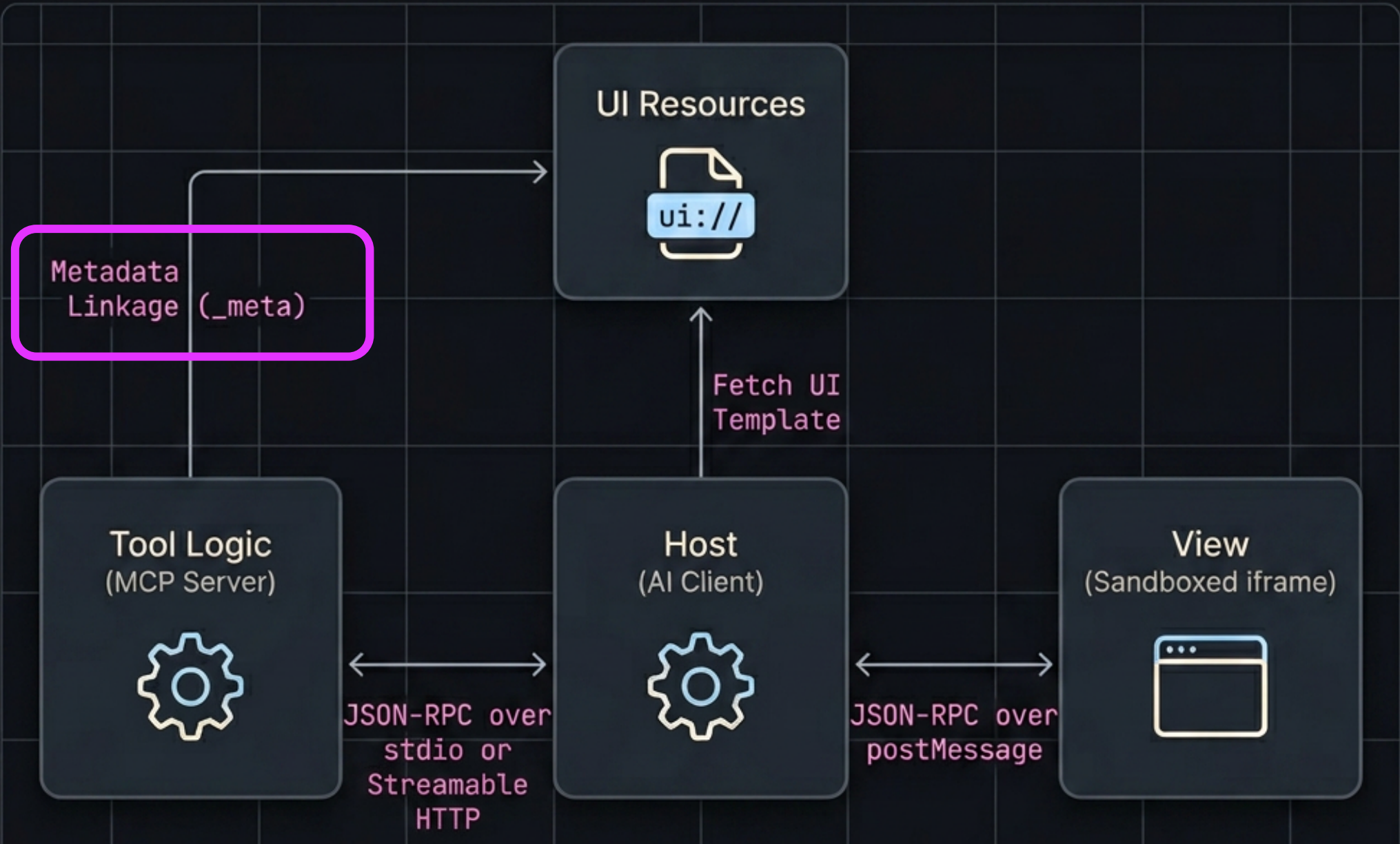
HTML content to be rendered



index.ts


```
1 server.registerTool(  
2   "greeting",    
3   {  
4     description: "Greet user in response to hello.",  
5     _meta: { ui: { resourceUri: `${URI}/greeting` } },  
6   },  
7   async () => {    
8     return { content: [{  
9       type: "text" as const,  
10      text: "A Greeting card is displayed"  
11    }] };  
12  },  
13 );
```

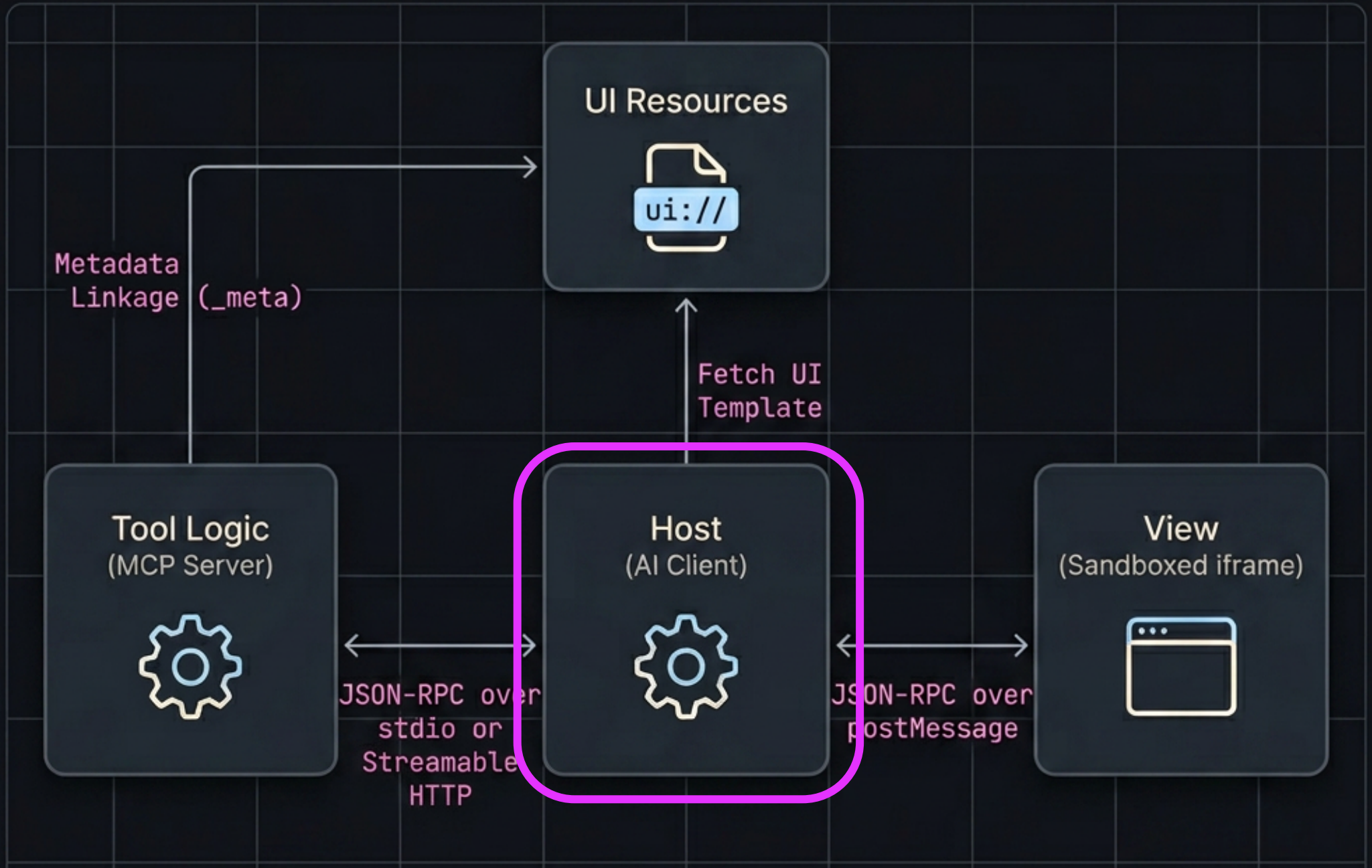


index.ts

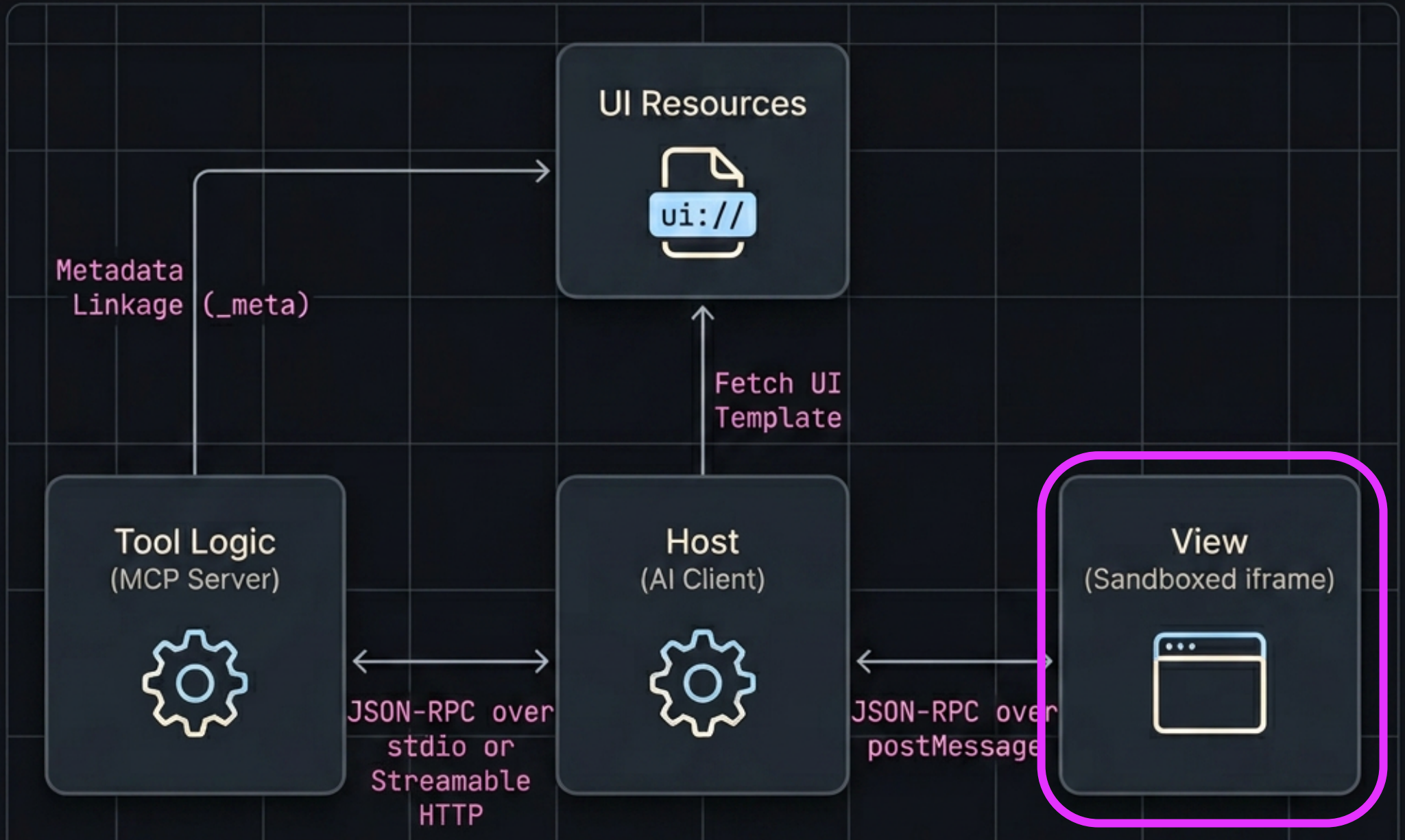
```
1 server.registerTool(  
2   "greeting",  
3   {  
4     description: "Greet user in response to hello.",  
5     _meta: { ui: { resourceUri: `${URI}/greeting` } },  
6   },  
7   async () => {  
8     return { content: [{  
9       type: "text" as const,  
10      text: "A Greeting card is displayed"  
11    }] };  
12  },  
13 );
```

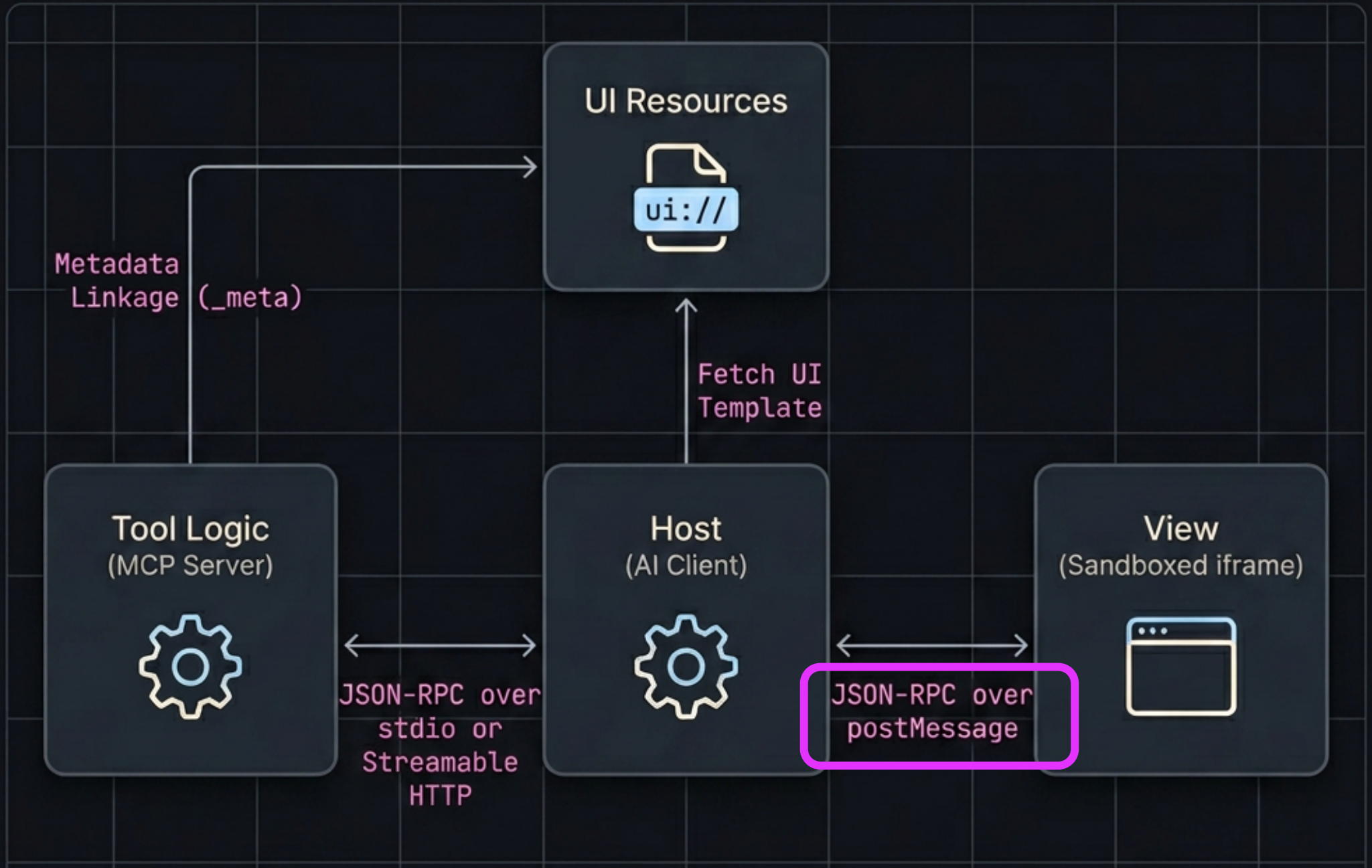


Link to pre-declared resource URI



Demo





Metadata Linkage (`_meta`)

UI Resources



Fetch UI Template

Tool Logic (MCP Server)



Host (AI Client)



View (Sandboxed iframe)



JSON-RPC over stdio or Streamable HTTP

JSON-RPC over postMessage

ui/greeting.ts

```
1 import { messageHandlerScript } from "../utils/message-handler.js";
2 import { rpcClientScript } from "../utils/rpc-client.js";
3
4 export function GREETING_HTML(): string {
5   return `<!DOCTYPE html>
6   ...
7   ...
8   <script>
9     ${rpcClientScript()}
10    ${messageHandlerScript()}
11
12    request('ui/initialize', {
13      protocolVersion: '2026-01-26',
14      appInfo: { name: 'greeting', version: '1.0.0' },
15      appCapabilities: {},
16    }).then((res) => {
17      notify('ui/notifications/initialized'),
18      document.getElementById('status').textContent = '✅ Handshake complete – UI is live.';
19    });
20  </script>
21 </body></html>`;
22 }
```

Initiate Handshake with Host

Handshake completed

Demo

# MCP Apps Specific Requests (View → Host)

# ui/open-link



```
1 async function openLink() {
2   const url = document.getElementById("urlInput").value;
3   try {
4     await request("ui/open-link", { url });
5     el.textContent = "✅ Host accepted";
6   } catch (err) {
7     el.textContent = "❌ Host denied or error";
8   }
9 }
```

Demo

# ui/message



```
1 await request("ui/message", {  
2   role: "user",  
3   content: [{ type: "text", text }],  
4 });
```

Demo

- ui/update-model-context
- ui/download-file

MCP Apps Specific Notifications (Host  
→ View)

- ui/notifications/tool-input
- ui/notifications/tool-result
- ui/notifications/host-context-changed

tools/call



```
1 import { z } from "zod";
2
3 server.registerTool(
4   "eval-tool",
5   {
6     description: "Evaluates a string expression.",
7     inputSchema: { expression: z.string().describe("Expression") },
8   },
9   async (args: { expression: string }) => {
10     const result = { result: eval(args.expression) };
11     return {
12       content: [{ type: "text" as const, text: `Echo: ${args.expression}` }],
13       structuredContent: result,
14     };
15   },
16 );
```

```
1 import { z } from "zod";
2
3 server.registerTool(
4   "eval-tool",
5   {
6     description: "Evaluates a string expression.",
7     inputSchema: { expression: z.string().describe("Expression") },
8     _meta: {
9       ui: {
10         visibility: ["app"],
11       },
12     },
13   },
14   async (args: { expression: string }) => {
15     const result = { result: eval(args.expression) };
16     return {
17       content: [{ type: "text" as const, text: `Echo: ${args.expression}` }],
18       structuredContent: result,
19     };
20   },
21 );
```

Demo

# Content Security Policy (CSP)

```
server.registerResource(
  "csp-example",
  `${URI}/csp-example`,
  { mimeType: MIME, description: "Declaring CSP Domains" },
  async (uri) => ({
    contents: [{
      uri: uri.href,
      mimeType: MIME,
      text: CSP_EXAMPLE_HTML(),
      _meta: {
        ui: {
          csp: {
            connectDomains: ["https://httpbin.org"],
            resourceDomains: ["https://cdn.jsdelivr.net"],
          },
        },
      },
    }],
  }),
);
```

Demo

Demo

# Host-aware Theme



```
--color-background-primary
--color-background-secondary
....
--color-text-primary
--color-text-secondary
....
--font-weight-semibold
--font-weight-bold
....
--font-text-xs-line-height
--font-text-sm-line-height
....
```



```
function applyHostContext(ctx) {
  if (!ctx) return;
  if (ctx.theme) document.documentElement.style.colorScheme = ctx.theme;
  if (ctx.styles?.variables) {
    for (const [k, v] of Object.entries(ctx.styles.variables)) {
      if (v != null) document.documentElement.style.setProperty(k, v);
    }
  }
  if (ctx.styles?.css?.fonts) {
    const s = document.createElement('style');
    s.textContent = ctx.styles.css.fonts;
    document.head.appendChild(s);
  }
}

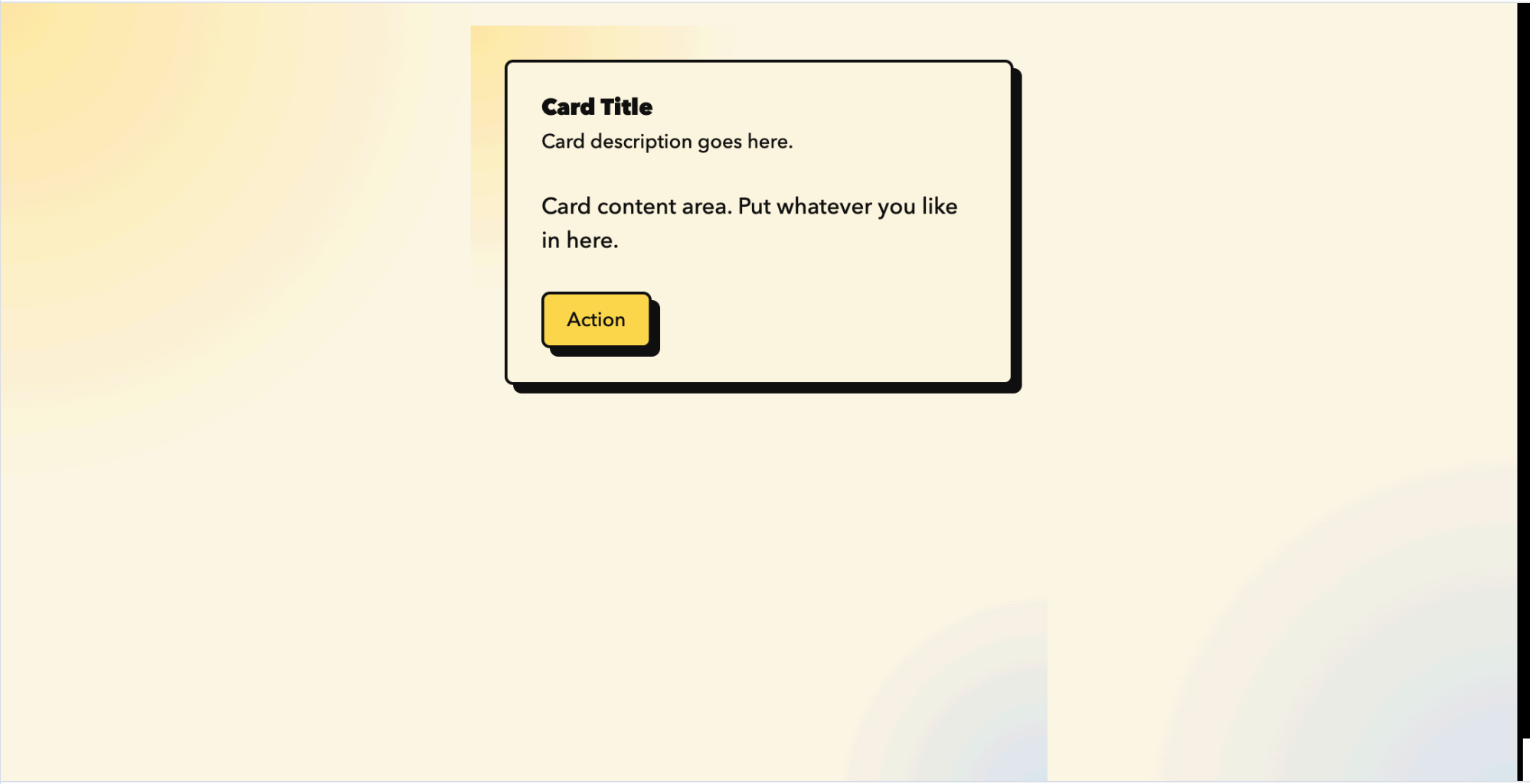
request('ui/initialize', {
  protocolVersion: '2026-01-26',
  appInfo: { name: 'greeting', version: '1.0.0' },
  appCapabilities: {},
}).then((res) => {
  applyHostContext(res?.hostContext);
  notify('ui/notifications/initialized');
  document.getElementById('status').textContent = '✅ Applied Host
Context & Handshake complete.';
})
```



Get started 29%

Find components

- UI
- Accordion
  - Single
  - Multiple
- AlertDialog
- Alert
- Avatar
- Badge
- Breadcrumb
- Button
  - Default
  - Neutral
  - Reverse
  - No Shadow
  - Sizes
  - Variant Ramp
- Calendar
- Card
  - Default
  - Simple Card
  - Card Grid



Controls    Actions    **Interactions**    [List Icon] [Close Icon]

PASS | Scroll to end | [Previous] [Next] [Refresh]

[card.stories.tsx](#)

**Interactions**

Interactions allow you to verify the functional aspects of UIs. Write a play function for your story and you'll see it run here.

[Read docs >](#)

Demo

Still running your MCP  
server locally!

# Deploying your MCP Server (1/3)

## 1 Prepare the server for AgentCore Runtime

- Bind the server to `0.0.0.0:8000` and expose a `POST /mcp` endpoint via Streamable HTTP transport
- Target `linux/arm64` in your container build

## 2 Add a Dockerfile

```
FROM --platform=linux/arm64 node:22-slim
WORKDIR /app
COPY package.json package-lock.json ./
RUN npm ci --omit=dev --ignore-scripts
COPY --from=builder /app/dist/ ./dist/
ENV PORT=8000
ENV HOST=0.0.0.0
EXPOSE 8000
CMD ["node", "dist/index.js"]
```

## 3 Add .dockerignore

```
node_module
s
dist
agentcore
.git
*.md
```

## 4 Verify build locally

```
docker build --platform linux/arm64 -t sales-mcp-apps .
docker run --platform linux/arm64 -p 8000:8000 sales-mcp-apps

# Test with MCP Inspector
npx @modelcontextprotocol/inspector http://localhost:8000/mcp
```

# Deploying your MCP Server (2/3)

## 5 Install AgentCore CLI & scaffold the project

```
# Install the CLI globally
npm install -g @aws/agentcore
agentcore --version

# Scaffold an MCP container project
agentcore create --name salesmcpapps \
  --protocol MCP --build Container \
  --no-agent --skip-python-setup --skip-git
```

## 6 Configure deployment target

```
[{
  "name": "default",
  "description": "Production deployment",
  "account": "YOUR_ACCOUNT_ID",
  "region": "us-east-1"
}]
```

## 7 Cognito user pool

```
export REGION=us-east-1

POOL_ID=$(aws cognito-idp create-user-pool \
  --pool-name "salesmcpapps-pool" --region
$REGION \
  --query 'UserPool.Id' --output text)

aws cognito-idp create-user-pool-domain \
  --user-pool-id $POOL_ID \
  --domain "salesmcpapps-auth" --region $REGION
```

## 8 Create a Resource Server and App Client

## 9 Add JWT auth to agentcore.json

# Deploying your MCP Server (3/3)

## 10 Deploy

```
agentcore deploy --target default --yes
```

## 11 Get the bearer token

```
TOKEN=$(curl -s -X POST \  
  "https://salesmcpapps-auth.auth.  
  $REGION.amazoncognito.com/oauth2/token" \  
  -H "Content-Type: application/x-www-form-  
  urlencoded" \  
  -d  
  "grant_type=client_credentials&client_id=$CLIENT_ID&  
  client_secret=$CLIENT_SECRET&scope=salesmcpapps-  
  auth/invoke" \  
  | python3 -c "import sys,json;  
  print(json.load(sys.stdin)['access_token'])")
```

## 12 Test the remote server

```
curl -s -X POST \  
  "https://bedrock-agentcore.  
  $REGION.amazonaws.com/runtimes/${ENCODED_ARN}/  
  invocations" \  
  -H "Content-Type: application/json" \  
  -H "Accept: application/json, text/event-stream"  
 \  
  -H "Authorization: Bearer $TOKEN" \  
  -H "User-Agent: test-client/1.0" \  
  -d  
  '{"jsonrpc":"2.0","id":1,"method":"initialize","pa  
  rams":  
  {"protocolVersion":"2025-03-26","capabilities":  
  {},"clientInfo":  
  {"name":"test","version":"1.0.0"}}}' \  
  | python3 -m json.tool
```

## 13 Add the Remote MCP server configuration in your MCP App supported Client

Some real-time action!

Demo



Ashita Prasad

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