**🧱 Full Chatbot Widget – Code Block Breakdown**

| **Layer** | **Description** | **Code Blocks** |
| --- | --- | --- |
| **1. Frontend (React UI)** | Chat interface, styles, logic | **3–5 blocks** |
| **2. Backend (FastAPI API)** | Endpoint + NLP + routing | **5–6 blocks** |
| **3. ML (spaCy NLP Model)** | Training, config, model | **3–4 blocks** |
| **4. Deployment & Config** | Host, CORS, build settings | **2–3 blocks** |
| **Total Estimated Code Units** |  | **13–18 blocks** |

**🔍 Detailed Code Block Listing**

**✅ 1. Frontend: React.js + Tailwind + shadcn/ui**

📂 frontend/

| **File / Module** | **Purpose** |
| --- | --- |
| Chatbot.tsx | Main React chatbot component (UI + logic) |
| App.tsx | Embeds chatbot in app layout |
| tailwind.config.js | Tailwind setup |
| shadcn.config.ts | UI styling |
| index.css | Global styles (optional) |

👉 **~5 blocks**

**✅ 2. Backend: FastAPI + spaCy integration**

📂 backend/app/

| **File / Module** | **Purpose** |
| --- | --- |
| main.py | FastAPI entrypoint with /chat endpoint |
| router.py | Intent routing logic |
| nlp\_handler.py | Load spaCy model + detect intent |
| rule\_responses.py | Rule-based response mapping |
| gpt\_fallback.py (optional) | Transformer fallback (e.g., GPT-2) |
| config.py (optional) | Model paths, language config |

👉 **~5–6 blocks**

**✅ 3. NLP Model: spaCy**

📂 backend/nlp/

| **File / Module** | **Purpose** |
| --- | --- |
| train\_data.json | Intent training examples |
| config.cfg | spaCy pipeline config |
| train.py | Custom script to train model |
| model\_en/ & model\_fa/ | Exported models |

👉 **~3–4 blocks**

**✅ 4. Deployment & Hosting**

| **File / Module** | **Purpose** |
| --- | --- |
| requirements.txt | Dependencies for FastAPI app |
| vercel.json / netlify.toml | Frontend hosting config |
| Procfile / render.yaml | API hosting (Render/Railway) |

👉 **~2–3 blocks**

**✅ Summary**

| **Layer** | **Code Blocks (Estimated)** |
| --- | --- |
| Frontend | 5 |
| Backend | 6 |
| ML / spaCy | 4 |
| Deployment / Config | 3 |
| **Total** | **~18 Code Blocks** |