

Istraživanje AutoCAD API-ja

AutoCAD web API

Na stranici dokumentacija AutoCAD API-ja (<https://aps.autodesk.com/developer/documentation>) filtriranjem API-ja po jezicima naišao sam na točno 7 API-ja koji AutoCAD-a koji podržavaju integraciju s web sučeljem

The screenshot displays the Autodesk API documentation interface. On the left, there are two filter sections: 'Filter by industry' and 'Filter by capability'. The 'Filter by industry' section includes buttons for Architecture, Construction, Design, Engineering, Entertainment, Film & VFX, Gaming & VR, Industrial design, MEP, Manufacturing & production, Media, Product design & engineering, and Structural design. The 'Filter by capability' section includes buttons for 3D modeling, Administration, Animation, Authentication, Automation, BIM coordination, Bid management, CAD, CNC/CAM programming, Collaboration & control, Concept design, Construction management, Cost management, Data management, Design, Digital twin, Document management, Drafting, Fabrication, File translation, Generative design, Motion capture, Project management, Rendering, Risk management, Schematic design, Simulation, Structural analysis, Surfacing, VR, Visual effects, and Visualization. Below these is a 'Filter by language' section with buttons for .NET, C#, C++, GraphQL, JavaScript, Node, Node.js, Python, QT scripting, React, VB.NET, Visual C#, and Visual LISP. The main content area on the right lists seven APIs, each with a description and a 'Find APIs' button. The APIs are: Authentication API, Autodesk Construction Cloud APIs, BIM 360 APIs, Data Exchange API (Beta), Data Management API, Data Visualization SDK, Flow Graph Engine API (Beta), and Tandem Data API (New). The Viewer SDK is also listed at the bottom of the list.

Filter by industry

Architecture Construction Design Engineering Entertainment Film & VFX Gaming & VR Industrial design MEP Manufacturing & production Media Product design & engineering Structural design

Filter by capability

3D modeling Administration Animation Authentication Automation BIM coordination Bid management CAD CNC/CAM programming Collaboration & control Concept design Construction management Cost management Data management Design Digital twin Document management Drafting Fabrication File translation Generative design Motion capture Project management Rendering Risk management Schematic design Simulation Structural analysis Surfacing VR Visual effects Visualization

Filter by language

.NET C# C++ GraphQL JavaScript Node Node.js Python QT scripting React VB.NET Visual C# Visual LISP

Authentication API
Generate tokens using the OAuth 2.0 standard to authenticate requests made to APS APIs and SDKs.
Find APIs

Autodesk Construction Cloud APIs
Create powerful integrations to extend platform capabilities in the construction ecosystem.
Find APIs

BIM 360 APIs
Integrate with Autodesk BIM 360 to extend capabilities and reach untapped segments of the construction ecosystem needing direct BIM data access.
Find APIs

Data Exchange API Beta
Efficiently connect and access subsets of design data in your app of choice, without hefty file translations, imports, or exports.
Find APIs

Data Management API
Access data from BIM 360 Team, Fusion Team, BIM 360 Docs, and Object Storage Service to create apps that enhance data display and provide added value to users.
Find APIs

Data Visualization SDK
Visualize heatmaps and sprites with custom data on your design models to create Digital Twin solutions using the Data Visualization and Viewer APIs.
Find APIs

Flow Graph Engine API Beta
Enhance design processes and run multiple operations concurrently with cloud-based automation, optimizing resources and time.
Find APIs

Tandem Data API New
Access your digital twin assets, spaces, systems, and time-series sensor data. Use it to integrate with external maintenance management systems.
Find APIs

Viewer SDK
Render 2D and 3D model data within a browser. View models from over 50+ file formats.
Find APIs

API za integraciju AutoCAD-a sa browserom

Authentication API

- temeljni API koji kreira token za pristup Autodesk funkcionalnostima
- koristi OAuth2
- omogućava pristup raznim servisima bez uporabe šifre
- olakšava rad sa programima treće stranke

Princip rada:

1. web aplikacija šalje HTTP request prema OAuth REST endpoint-u sa korisničkim podacima
2. token se vraća aplikaciji
3. u budućim zahtjevima token se "ugrađuje" u header zahtjeva

! POTREBNO REGISTRIRATI APLIKACIJU NA AUTODESK DEVELOPER PORTALU !

- dobije se client_id i client_secret
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Autodesk Construction Cloud API-ji

- **Autodesk Construction Cloud** - unificirana platforma za upravljanje izgradnjom
- API-ji koji omogućavaju kreiranje aplikacija integriranih s platformom
 - manipulacija projektnim podacima (dizajn, dokumenti, modeli) u realnom vremenu

LISTA API-ja

Account Admin

Automate project setup, managing member and partner directories, and syncing data with external systems.

[→ API reference](#)

Assets

Create, manage, and search assets, improving their organization and workflow efficiency within Autodesk Construction Cloud Assets.

[→ API reference](#)

AutoSpecs

Access draft submittal logs, extracted from construction project specification documents.

[→ API reference](#)

Cost Management

Manage budget and cost changes in Autodesk Construction Cloud by accessing, exporting, and importing data to and from external systems.

[→ API reference](#)

Data Connector

Retrieve data from several Autodesk Construction Cloud services for local analysis, reporting, and business intelligence.

[→ API reference](#)

Files

Access, upload, and share 2D plans, 3D intelligent models, and any other project documents to maximize collaboration.

[→ API reference](#)

Forms

Access data stored in the Forms module, which enables your team to securely fill out, review, and manage project forms.

[→ API reference](#)

Issues

Create and update project-associated issues in Autodesk Construction Cloud for tracking and management of tasks and problems.

[→ API reference](#)

Locations

Configure a hierarchy of building areas in projects, to identify the location of Assets, Issues, Photos, Forms, and more.

[→ API reference](#)

Model Coordination

Manage issues when combining 3D models from different design disciplines into unified project coordination spaces.

[→ API reference](#)

Model Properties

Build and query indexes from properties in intelligent models uploaded to Autodesk and BIM 360 Docs, and calculate changes (diffs) between consecutive model versions.

[→ API reference](#)

Photos

Access data stored in the Photos module, a single unified place to view and manage photos and videos in Autodesk Construction Cloud.

[→ API reference](#)

Relationships

Easily create, retrieve, and delete links between entities across all domains in Autodesk Construction Cloud.

[→ API reference](#)

RFIs

Create, track, and update RFIs, assigning members, transitioning states, and adding comments.

[→ API reference](#)

Takeoff

Retrieve and update takeoff project components like settings, packages, classifications, and content views.

[→ API reference](#)

Sheets

Manage and distribute sheets for field use. You can upload, publish, and organize sheet versions and sets.

[→ API reference](#)

Submittals

Access the submittal items a user has permission to view in a project.

[→ API reference](#)

BIM 360 API-ji

- **BIM 360** - zastarjela verzija Autodesk Construction Cloud-a; ACC sadrži sve mogućnosti BIM 360-ja i više
- API-ji koji omogućavaju kreiranje aplikacija integriranih s platformom
 - manipulacija projektnim podacima (dizajn, dokumenti, modeli) u realnom vremenu

LISTA API-ja

Account Admin Automate and manage member and partner company directories at the account level, and synchronize data with external systems. → API reference	Assets Create, manage, and search assets, improving their organization and workflow efficiency. → API reference	Checklists Track, sort, and filter information about checklists, checklist templates, and checklist signatures. → API reference
Cost Management Manage budget and cost changes by accessing, exporting, and importing data to and from external systems. → API reference	Data Connector Retrieve data from several BIM 360 services for local analysis, reporting, and business intelligence. → API reference	Document Management Access, upload, and share 2D plans, 3D BIM models, and more to maximize collaboration. Part of Data Management API . → API reference
Issues V2 Create and update project and specific document-associated issues for tracking and management of tasks and problems. → API reference	Locations Manage and share the hierarchy of building areas in your project. → API reference	Model Coordination Manage issues when combining 3D models from different design disciplines into unified project coordination spaces. → API reference
Model Properties Build and query indexes from properties in BIM models uploaded to Autodesk and BIM 360 Docs, and calculate changes (diffs) between consecutive model versions. → API reference	Relationships Create, retrieve, and delete links between entities across domains. → API reference	RFIs Create, track, and update RFIs, assigning members, transitioning states, and adding comments and attachments. → API reference

Data Exchange API

- kontrola, dijeljenje i spajanje podataka između više timova i aplikacija

- uglavnom dijeljenje potpunih ili djelomičnih 3D modela preko BIM, CAD ili nekih drugih aplikacija za poslovanje
 - upravljanje podacima preko Autodesk Docs
 - podaci - geometrijski dizajn koji se lomi na granularne objekte
 - za više mogućnosti preporučuje se uporaba SDK
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Data Management API

- upravljanje podacima preko platformi kao što su BIM 360 Team, Fusion Team, BIM 360 Docs, A360 Personal i Object Storage System
 - različiti workflow-ovi
 - API za Project Service, Data Service, Schema Service, i OSS za navigiranje projektima upravljanje metapodacima razumijevanje podatkovne strukture i upravljanje upload-om i download-om
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Flow Graph Engine API

- automatizacija, ubrzavanje i skaliranje dizajnerskih procesa
 - prebacivanje velikog procesiranja na cloud - *cloud computing*
 - pokretanje više operacija simultano
 - kontrola trenutnih zadataka i preuzimanje output-a koji se se generira na cloud-u
 - **resource API** - za upload i download podataka
 - **job API** - za izvršavanje radnje i praćenje stanja nakon radnje
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Tandem Data API

- čitanje BIM modela
 - čitanje i pisanje prilagođene scheme svojstava
 - integracija vanjskih sistema, uključujući Asset Management, Work-order sisteme, IoT senzore
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• Webhooks API

- notifikacije u stvarnom vremenu: Primajte obavijesti o promjenama na AutoCAD datotekama u stvarnom vremenu.
- prilagodba događaja: Mogućnost prilagođavanja tipova događaja i resursa za koje korisnik želi primati obavijesti.
- slanje obavijesti: Webhook API šalje obavijest na određeni URL ako dođe do promjena u podacima.

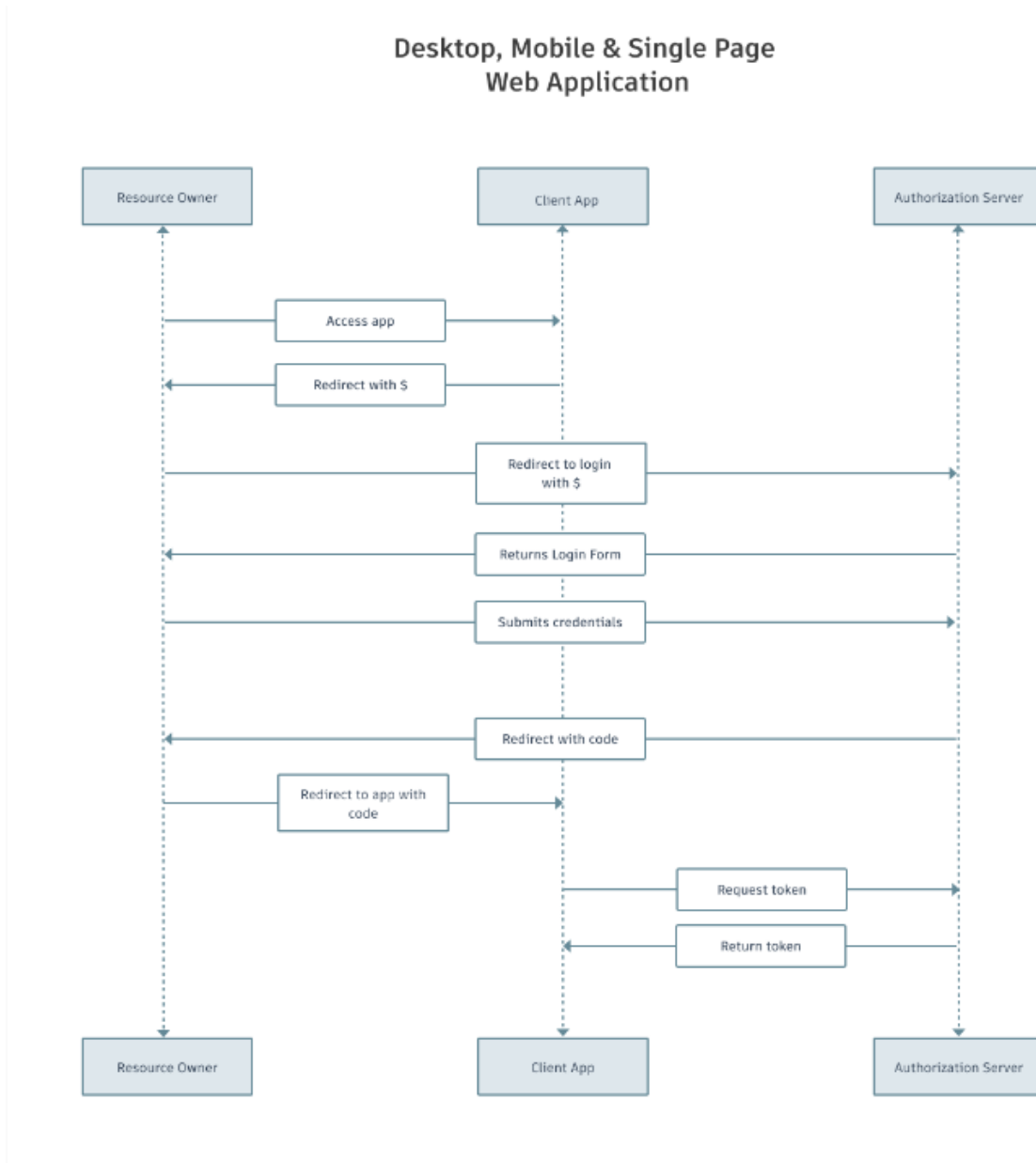
Mogućnost integracije sa web sučeljem

Single Page Web Application

- kada se aplikacija plasira na mašine krajnjih korisnika
- koristi *Authorization Code* privolu sa *Proof Key for Code Exchange*

- kako takva aplikacija ne može sigurno čuvati podatke klijenta razvijen je Proof Key of Code Exchange
 1. korisnik pristupa klijentskoj aplikaciji
 2. klijentska aplikacija generira *code_verifier* i pretvara ga u *code_challenge*
 - *code_verifier* - random ključ koji preventira autorizacijski kod od intercepcije
 - *code_challenge* - nakon što se ključ generira, preko *code_challenge_method* se transformira u *code_challenger*
 3. klijentska aplikacija zove *authorize* endpoint od servera za autorizaciju
 - šalje *code_challenge*, *code_challenge_method* sa zahtjevom za autorizaciju
 4. autorizacijski server vraća URI za redirekciju
 - korisniku se pruža privola za dozvolu korištenja
 5. korisnik autenticira zahtjev preko izvora identiteta
 6. autorizacijski server izdaje kod za autorizaciju
 7. klijentska aplikacija zahtjeva autentikaciju prema *token* endpointu koristeći autorizacijski token
 - šalje se *code_challenge*
 8. autorizacijski server validira autorizacijski kod, *code_verifier* i *code_challenger*
 - rezultati
 - autorizacijski kod je validiran
 - *code_verifier* i *code_challenger* su isti
 9. autorizacijski server vraća token
 10. klijentska aplikacija ugrađuje tok u zahtjev prema zaštićenom resursu na serveru

11. resursni server validira token i vraća podatke



Tradicionalna web aplikacija

- kada se gradi aplikacija za web koja ima mogućnost sigurnog čuvanja podataka na web serveru
- koristi *Authorization Code* samo
 1. aplikacija redirektira korisnički preglednik na APS Identity Provider (IDP) login stranicu
 2. korisnik autentificira
 3. autorizacijski server generira kod za autorizaciju
 4. autorizacijski server redirektira aplikaciju koristeći *callback* sa kodom ugrađenim u zaglavlje
 5. aplikacija čita kod iz URL
 6. aplikacija mijenja taj kod za pristupni kod, i šalje poziv prema autorizacijskom serveru
 7. aplikacija sada može koristiti te tokene kako bi slala zahtjeve

Traditional Web Application

