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(2009). The Impact of Building Information Modelling: Transforming Construction. Building information modelling software RevitDeveloper(s)AutodeskInitial releaseApril 5, 2000Stable release2023 / April 2022 Operating system64-bit WindowsTypeCAD building information modelingLicenseProprietaryWebsitewww.autodesk.com/products/revit/overview Autodesk Revit is a building information modelling software for architects, landscape architects, structural engineers, mechanical, electrical, and plumbing (MEP) engineers, designers and contractors. John's first digitized 3D model was a car made in 1984 using Movie.byu on a HP 9000 computer. ^ "Lands' End First With New 'My Virtual Model' Technology: Takes Guesswork Out of Web Shopping for Clothes That Fit". ^ "The Future of 3D Modeling". ISBN 9781136860560. In 1999 they hired Dave Lemont as CEO and recruited board members Jon Hirschtick, founder of SolidWorks, and Arol Wolford, founder of CMD Group. Solid and shell modeling can create functionally identical objects. Revit includes categories of objects ('families' in Revit terminology). ^ "3D virtual reality models help yield better surgical outcomes: Innovative technology improves visualization of patient anatomy, study finds". Rendering When a user creates a building, model, or any other kind of object in Revit, they may use Revit's rendering engine to make a more realistic image of what is otherwise a very diagrammatic model. pp. 396–400. PRNewswire. ^ Tredinnick Ross, Victoria Interrante (October 2006). ^ "Patent: Software usage/procurement management". Simply put, the source of the geometry for the shape of an object can be: A designer, industrial engineer or artist using a 3D-CAD system An existing object, reverse engineered or copied using a 3-D shape digitizer or scanner Mathematical data stored in memory based on a numerical description or calculation of the object.[18] A wide number of 3D software are also used in constructing digital representation of mechanical models or parts before they are actually manufactured. Retrieved June 16, 2012. 3D CAD Software. OCLC 27810960. Often, the artists' goal is to get additional value out of assets they have previously created for projects. ^ "ERIS Project Starts". By doing so, artists can earn more money out of their old content, and companies can save money by buying pre-made models instead of paying an employee to create one from scratch. ^ "How to 3D scan with a phone: Here are our best tips". ^ "Revit Architecture content". External links Wikibooks has a book on the topic of: Revit User's Manual Wikimedia Commons has media related to Revit Architecture. | How 3D Modeling is Used Today". Some of those platforms also offer 3D printing services on demand, software for model rendering and dynamic viewing of items, etc. These methods allow for very artistic exploration as the model will have a new topology created over it once the models form and possibly details have been sculpted. London: SPON/Routledge. 2018-04-27. These fall into three groups: System families, such as walls, floors, roofs, ceilings, major finishes, and even furniture built inside a project Loadable families/components, which are built with primitives (extrusions, sweeps, etc.) separately from the project and loaded into a project for use In-place families, which are built in-situ within a project with the same toolset as loadable components An experienced user can create realistic and accurate families ranging from furniture[17] to lighting fixtures,[18] as well as import existing models from other programs. The software allows users to design a building and structure and its components in 3D, annotate the model with 2D drafting elements, and access building information from the building model's database.[1] Revit is 4D building information modeling capable with tools to plan and track various stages in the building's lifecycle, from concept to construction and later maintenance and/or demolition. Autodesk Inc. "Dynamo for Revit?". Archived from the original on July 13, 2017. Introducing Revit architecture 2010 : BIM for beginners. Complex materials such as blowing sand, clouds, and liquid sprays are modeled with particle systems, and are a mass of 3D coordinates which have either points, polygons, texture splats, or sprites assigned to them. A 3D Model can also be displayed as a two-dimensional image through a process called 3D rendering or used in a computer simulation of physical phenomena. See also List of 3D modeling software List of common 3D test models List of file formats#3D graphics 3D city model 3D computer graphics software 3D figure 3D printing 3D scanner 3D scanning Additive manufacturing file format Building information modeling Cloth modeling Computer facial animation Cornell box Digital geometry Edge loop Geological modeling Holography Industrial CT scanning Marching cubes Open CASCADE Polygon mesh Polygonal modeling Ray tracing (graphics) Scaling (geometry) SIGGRAPH Stanford bunny Triangle mesh Utah teapot Voxel B-rep References ^ "What is 3D Modeling & What's It Used For?". Someone who works with 3D models may be referred to as a 3D artist or a 3D modeler. Increasing the weight for a point will pull the curve closer to that point. TechCrunch. via interconnected databases. ^ "Patent: Graphical object generation and regeneration". "Autodesk Announces Autodesk Revit LT". Official website Retrieved from " 2Form of computer-aided engineering This article is about computer modeling within an artistic medium. ^ "Compare Autodesk Revit LT and Autodesk Revit". Retrieved December 16, 2012. Further reading Dzambazova, Tatjana; Eddy Krygiel, Greg Demchak. At the time, several other software packages—such as ArchiCAD and Reflex—provided a three-dimensional virtual building model, and let the user control individual components via parameters (parametric components). ^ Slick, Justin (2020-09-24). ^ Alec Appelbaum (February 11, 2009). ^ "New Trends in 3D Printing – Customized Medical Devices". The designer can then see the model in various directions and views, this can help the designer see if the object is created as intended to compared to their original vision. The human virtual models were created by the company My Virtual Mode Inc. Autodesk, Inc. Retrieved 2013-11-24. Retrieved September 2, 2012. Because of copyright issues in project work, fully 3D-modeled Revit project models are rarely for sale. Please help improve this article by adding citations to reliable sources. Autodesk sells several packages or 'industry collections'; Revit is included in the AEC Collection. ^ "Facebook and Matterport collaborate on realistic virtual training environments for AI". Cleanup and further processing can be performed with applications such as MeshLab, the GigaMesh Software Framework, netfabb or MeshMixer. pp. 1–12, 75, 192–194. The engineering community utilizes them as designs of new devices, vehicles and structures as well as a host of other uses. ^ Autodesk to Acquire Revit Technology Corporation, 2002 Autodesk Press Release ^ Bergin, Michael S. Archived from the original on February 18, 2013. At the heart of Revit is a parametric change propagation engine that relied on a new technology, context-driven parametrics, that was more scalable than the variational and history-driven parametrics used in mechanical CAD software.[6] The term parametric building model was adopted to reflect the fact that changes to parameters drove the whole building model and associated documentation, not just individual components. Vol. 672. The science sector uses them as highly detailed models of chemical compounds.[25] The architecture industry uses them to demonstrate proposed buildings and landscapes in lieu of traditional, physical architectural models. ^ Rector, Emily (2019-09-17). ^ "3D Printing Toys". Retrieved 25 December 2015. 3D Models may be created automatically or manually. ^ "Scanning and Detecting 3D Objects with iPhone's Lidar Technology | Hacker Noon". February 12, 2004. Lifewire. ^ "3D Modeling: Creating 3D Objects". Disadvantages compare to 2D photorealistic rendering may include a software learning curve and difficulty achieving certain photorealistic effects. ACADIA 2006: Synthetic Landscapes Digital ExchangeDigital Dissemination: Dissemination and Representation: 329. CGElves. ^ "What does full bi-directional associativity mean". ^ Crotty, Ray (2012). Volumetric, loosely based on voxels, has similar capabilities as displacement but does not suffer from polygon stretching when there are not enough polygons in a region to achieve a deformation. Several online marketplaces for 3D content allow individual artists to sell content that they have created, including TurboSquid, CGStudio, CreativeMarket, MyMiniFactory, Sketchfab, CGTrader and Cults. Metadata and Semantics Research. "What is 3D Modeling and Design? Level sets are a useful representation for deforming surfaces which undergo many topological changes such as fluids. (2014). A 3D fantasy fish composed of organic surfaces generated using LAI4D. External links Look up modeler in Wiktionary, the free dictionary. The new mesh will usually have the original high resolution mesh information transferred into displacement data or normal map data if for a game engine. ^ Marketing, TOPS (2020-04-27). Almost all 3D models can be divided into two categories: Solid – These models define the volume of the object they represent (like a rock). The process of transforming representations of objects, such as the middle point coordinate of a sphere and a point on its circumference into a polygon representation of a sphere, is called tessellation. Retrieved September 6, 2012. In some cases, there is no strict distinction between these phases; in such cases modeling is just part of the scene creation process (this is the case, for example, with Caligari trueSpace and Realsoft 3D). These tests verify if a product is developed correctly or if it needs to be modified to meet its requirements. "Revit Spaghetti". Indianapolis, Ind.: Wiley Pub. Over the last several years numerous marketplaces specialized in 3D printing models have emerged. International Journal of Heritage in the Digital Era. The user can also begin with a "Generic" material. Revit models may also be linked directly into Autodesk 3ds Max (release 2013 and later) for more advanced rendering and animation projects with much of their material and object information maintained. of plates : ill. Retrieved 2022-02-03. Autodesk Seek. Media related to 3D modeling at Wikimedia Commons Retrieved from " 3D printing file sharing platforms include Shapeways, Sketchfab, Pinshape, Thingiverse, TurboSquid, CGTrader, Threeding, MyMiniFactory, 3Dfindit.com and GrabCAD. Retrieved 2022-02-28. MarketScale. Modeling The Revit work environment allows users to manipulate whole buildings or assemblies (in the project environment) or individual 3D shapes (in the family editor environment). Almost all visual models used in games and film are shell models. Photogrammetry creates models using algorithms to interpret the shape and texture of real-world objects and environments based on photographs taken from many angles of the subject. Different design will need to be tested in different ways. Individual programs of this class, such as SketchUp, are called modeling applications.[8] History Three-dimensional model of a spectrograph[9] Rotating 3D video-game model 3D selfie models are generated from 2D pictures taken at the Fantasitron 3D photo booth at Madurodam 3D models are now widely used anywhere in 3D graphics and CAD but their history predates the widespread use of 3D graphics on personal computers.[10] In the past, many computer games used pre-rendered images of 3D models as sprites before computers could render them in real-time. Software Overview From the outset, Revit was intended to allow architects and other building professionals to design and document a building by creating a parametric three-dimensional model that included both the geometry and non-geometric design and construction information, which is also known as building information modeling or BIM (1975 Eastman C.). Communications in Computer and Information Science. AutoCAD and Revit .. 3D printing Main articles: 3D printing and Rapid prototyping The term 3D printing or three-dimensional printing is a form of additive manufacturing technology where a three-dimensional object is created from successive layers material.[18] Objects can be created without the need for complex expensive molds or assembly with multiple parts. ScienceDaily. Retrieved 2020-11-05. Englewood Cliffs, N.J.: PTR Prentice Hall. ISBN 978-0-470-47355-9. The concept of bi-directional associativity[5] between components, views, and annotations was a distinguishing feature of Revit for many releases. Cloud-based rendering with the experimental plug-in dubbed Project Neon, located on Autodesk Labs is in the final phases and allows for the user to render their images through their Autodesk account instead of locally through their own computers. These marketplaces typically split the sale between themselves and the artist that created the asset, artists get 40% to 95% of the sales according to the marketplace. With this, the user can set the rotation, size, brightness, and intensity of textures, gloss maps (also known as shinemaps), transparency maps, reflection maps, oblique reflection maps, hole maps, and bump maps, as well as leaving the map part out and just using the sliders for any one (or all or none) of the aforementioned features of textures. The software progressed rapidly, with version 2.0, 3.0, 3.1, 4.0, and 4.1 released in August 2000; October 2000; February 2001; June 2001; November 2001; and January 2002, respectively.[7] The software was initially offered only as a monthly rental, with no option to purchase. Revit families can be created as parametric models with dimensions and properties. "X3D Fragment Identifiers —Extending the Open Annotation Model to Support Semantic Annotation of 3D Cultural Heritage Objects over the Web". "Rich Semantics for Interactive 3D Models of Cultural Artifacts". CGI Furniture. Today, 3D modeling is used in various industries like film, animation and gaming, interior design and architecture.[23] They are also used in the medical industry to create interactive representations of anatomy.[24] The medical industry uses detailed models of organs; these may be created with multiple 2-D image slices from an MRI or CT scan. This lets users modify a given component by changing predefined parameters such as height, width or number in the case of an array. Some of the 3D printing marketplaces are combination of models sharing sites, with or without a built in e-com capability. "A Tablet Based Immersive Architectural Design Tool". Dynamic tessellation,which is similar to voxel, divides the surface using triangulation to maintain a smooth surface and allow finer details. ^ "What is 3D Printing? Advantages of wireframe 3D modeling over exclusively 2D methods include: Flexibility, ability to change angles or animate images with quicker rendering of the changes; Ease of rendering, automatic calculation and rendering photorealistic effects rather than mentally visualizing or estimating; Accurate photorealism, less chance of human error in misplacing, overdoing, or forgetting to include a visual effect. Springer International Publishing. ^ "What is Solid Modeling? Retrieved 2021-07-14. Retrieved 25 January 2015. Grasshopper - generative modeling for Rhino. 3D models can also be created using the technique of Photogrammetry with dedicated programs such as RealityCapture, Metashape and 3DF Zephyr. The manual rendering process of preparing geometric data for 3D computer graphics is similar to plastic arts such as sculpting. p. 72. Retrieved 2017-11-18. Shell models must be manifold (having no holes or cracks in the shell) to be meaningful as a real object. In terms of video game development, 3D modeling is one stage in a longer development process. It may have types that describe different sizes, and the actual building model has instances of those types placed in walls where instance-based parameters could specify the door hardware uniquely for each occurrence of the door. After the 2006 release Revit Building was renamed Revit Architecture.[9][10] In 2011 Dynamo[11] was released in beta form allowing first glimpses of directly programming the behavior of hosted components through a drag and drop node interface. Human models Main article: Virtual actor The first widely available commercial application of human virtual models appeared in 1998 on the Lands' End web site. Autodesk, best known for its AutoCAD line of products, purchased Revit Technology Corporation for US$133 million in 2002.[3] The purchase allowed more research, development and improvement of the software. Comparison with 2D methods 3D photorealistic effects are often achieved without wire-frame modeling and are sometimes indistinguishable in the final form. Sculpteo. Automated fabrication : improving productivity in manufacturing. Inside the Factory - Designing the Revit Experience. ISBN 978-3-319-49156-1. The archaeology community is now creating 3D models of cultural heritage for research and visualization. Autodesk. ^ "3D Clothes made for The Hobbit using Marvelous Designer". ^ "All About Virtual Fashion and the Creation of 3D Clothing". ^ "Autodesk Revit LT". ^ "3D Modeling for Businesses". Archived from the original on September 7, 2012. Retrieved 14 June 2013. "Architecture and the Lost Art of Drawing". 3D models can also be the basis for physical devices that are built with 3D printers or CNC machines. Springer Science & Business Media. See also Comparison of computer-aided design editors Industry Foundation Classes Virtual design and construction References ^ Michael Graves (September 1, 2012). ISBN 978-1-4471-4931-6. ^ a b c Burns, Marshall (1993). The Utah teapot is one of the most common models used in 3D graphics education. Although Revit software comes with a range of families out of the box (OOTB), they are limited, so users may find a need to build their own families or buy them from online stores such as Plansort, Bimbandit or Andekan. Business Insider. 3D modeling is also used in the field of industrial design, where products are 3D modeled before representing them to the clients. The vast majority of 3D models today are built as textured polygonal models, because computers can render them so quickly. A number of websites offer families for free including Revit City, AUGI, BIMobject, BIMsmith, National BIM Library and BIM&CO. Many experienced BIM users also make and later sell their own families on these websites. ^ Jon Radoff, Anatomy of an MMORPG Archived 2009-12-13 at the Wayback Machine, August 22, 2008 ^ Yu, Faxin; Lu, Zheming; Luo, Hao; Wang, Pinghui (2011-02-03). GarageFarm. Indeed, as most projects are site-specific and bespoke, the demand for existing models is light anyway. Viewpoint didn't have a catalog, so John and his team quickly made the first catalog of 3D objects which included just a few 3D objects and "faxed" it to Wallace. There are a few sources for these, including websites such as BIMGallery and GrabCad. "What is 3D Modeling? ESO Announcement. Archived from the original on March 2, 2014. Curve types include nonuniform rational B-spline (NURBS), splines, patches, and geometric primitives Digital sculpting – Still a fairly new method of modeling, 3D sculpting has become very popular in the few years it has been around.[14] There are currently three types of digital sculpting: Displacement, which is the most widely used among applications at this moment, uses a dense model (often generated by subdivision surfaces of a polygon control mesh) and stores new locations for the vertex positions through use of an image map that stores the adjusted locations. Modeling tools can be used with pre-made solid objects or imported geometric models. Seeing the design this way can help the designer or company figure out changes or improvements needed to the product.[11] Representation A modern render of the iconic Utah teapot model developed by Martin Newell (1975). This is similar to the way the visual programming language Grasshopper 3d works on objects in Rhinoceros 3D.[12] In 2012[13] Revit LT[14] became the newest version of Revit on the market. The user accomplishes this either by using the premade model, wall, floor, etc., tools, or making their own models, walls, materials, etc. The curve follows (but does not necessarily interpolate) the points. Polygonal meshes (and to a lesser extent subdivision surfaces) are by far the most common representation. "What Is 3D Modeling?". doi:10.1007/978-3-319-49157-8_14. Revit is available in multiple language localizations: English, German, French, Spanish, Portuguese, Italian, Russian, Polish, Czech, Chinese, Japanese and Korean. 3 (3): 579–596. ISBN 978-3-642-12651-2. However, new practices or students of Revit may want to refer to completed models. The definitive guide". Curve modeling – Surfaces are defined by curves, which are influenced by weighted control points. The weight for each point will pull the curve towards that point. ^ Keough, Ian. Wallace called John and asked if Viewpoint had a 3d Football in their "catalog". Envisiontec. Licensing was controlled by an entirely automatic process, an innovation at a time when human intervention and manual transmission of authorization codes was required to buy other types of design software.[8] Autodesk released several versions of Revit after 2004. "Frank Gehry's software keeps buildings on budget". The modeling stage consists of shaping individual objects that are later used in the scene. (some col.) ; 24 cm. Unsourced material may be challenged and removed.Find sources: "3D modeling" – news · newspapers · books · scholar · JSTOR (April 2010) (Learn how and when to remove this template message) Three-dimensional (3D)computer graphics Fundamentals Modeling Scanning Rendering Printing Primary uses 3D models Computer-aided design Graphic design Video games Visual effects Visualization Virtual engineering Virtual reality Virtual cinematography Related topics Computer-generated imagery (CGI) Animation computer skeletal 3D display Wire-frame model Texture mapping Motion capture Crowd simulation Global illumination Volume rendering vte In 3D computer graphics, 3D modeling is the process of developing a mathematical coordinate-based representation of any surface of an object (inanimate or living) in three dimensions via specialized software by manipulating edges, vertices, and polygons in a simulated 3D space.[1][2][3] Three-dimensional (3D) models represent a physical body using a collection of points in 3D space, connected by various geometric entities such as triangles, lines, curved surfaces, etc.[4] Being a collection of data (points and other information), 3D models can be created manually, algorithmically (procedural modeling), or by scanning.[5][6] Their surfaces may be further defined with texture mapping. The video game industry uses them as assets for computer and video games. "The History of Revit - The Future of Design". Without a 3D model, a 3D print is not possible.[7] 3D modeling software is a class of 3D computer graphics software used to produce 3D models. ^ "3D Modeling". ^ Smith, Brett. ^ Peddie, John (2013). TOPS. London: Springer-Verlag. However, Revit is not a NURBS modeller and also lacks the ability to manipulate an object's individual polygons except on some specific object types such as roofs, slabs, and terrain or in the massing environment. Viewpoint's 3D model business grew to over $6 million in sales by 1998 and their models are still showing in thousands of movies (Total Recall, Independence Day, Antz, etc.) A large market for 3D models (as well as 3D-related content, such as textures, scripts, etc.) still exists – either for individual models or large collections. Three-Dimensional Model Analysis and Processing. In recent decades the earth science community has started to construct 3D geological models as a standard practice. Retrieved 2019-09-19. ^ Arkin, Gregory K. 2017-05-28. and enabled users to create a model of themselves and try on 3D clothing.[15] There are several modern programs that allow for the creation of virtual human models (Poser being one example). However, polygons are planar and can only approximate curved surfaces using many polygons. ^ "Revit MEP content". xvi, 480 p., [16] p. hackernoon.com. For example, a pool pump would need a simulation ran of the water running through the pump to see how the water flows through the pump. Solid models are mostly used for engineering and medical simulations, and are usually built with constructive solid geometry Shell or boundary – These models represent the surface, i.e. the boundary of the object, not its volume (like an infinitesimally thin eggshell). Archived from the original on September 27, 2012. For example, a swing door may be a Family. 5 November 2020. For scientific simulation. The movie industry uses them as characters and objects for animated and real-life motion pictures. OCLC 319209677. The original software was developed by Charles River Software, founded in 1997, renamed Revit Technology Corporation in 2000, and acquired by Autodesk in 2002. ^ Sikos, L. Revit3d.com. ISBN 0-13-119462-3. The ease of making changes inspired the name Revit, a contraction of Revise-Instantly. ^ "Autodesk Rental Plans". Differences between them are mostly variations in the way they are created and edited and conventions of use in various fields and differences in types of approximations between the model and reality. Retrieved December 15, 2012. ^ Yu, D.; Hunter, J. Lands' End. The company was renamed Revit Technology Corporation in January 2000. The first 3D model "Catalog" was made for Wallace Colvard in 1990 who was working for NBC to create the first football and helmet for a new super bowl 3d animation commercial called "Bud Bowl". Applications of Solid Modeling". ^ tom. It was a feature limited or Lite version of Revit which excluded features such as rendering and multi-user environments.[15] In 2013, Autodesk began introducing metal licensing for some of its products, including Revit.[16] Since Revit 2013 the different disciplines have been rolled into one product, simply called Revit. (2016). 17 December 2008. Meshes of triangles (instead of e.g. squares) are popular as they have proven to be easy to rasterize (the surface described by each triangle is planar, so the projection is always convex); ,[12] Polygon representations are not used in all rendering techniques, and in these cases the tessellation step is not included in the transition from abstract representation to rendered scene.[13] Process There are three popular ways to represent a model: Polygonal modeling – Points in 3D space, called vertices, are connected by line segments to form a polygon mesh. pp. 169–180. The 3D model can be physically created using 3D printing devices that form 2D layers of the model with three-dimensional material, one layer at a time. Company history Charles River Software was founded in Newton, Massachusetts, on October 31, 1997, by Leonid Raiz and Irwin Jungreis, key developers of PTC's Pro/Engineer software for mechanical design, with the intent of bringing the power of parametric modeling to the building industry (PTC had previously tried and failed to market its recently acquired Reflex software to the construction sector).[2] With funding from venture capitalists Atlas Venture and North Bridge Venture Partners, Raiz and Jungreis hired several software developers and architects and began developing Revit in C++ on the Microsoft Windows platform. This step is used in polygon-based rendering, where objects are broken down from abstract representations ("primitives") such as spheres, cones etc., to so-called meshes, which are nets of interconnected triangles. The New York Times. Some photorealistic effects may be achieved with special rendering filters included in the 3D modeling software. 3D printing allows ideas to be prototyped and tested without having to go through a production process.[18][19] In recent years, there has been an upsurge in the number of companies offering personalized 3D printed models of objects that have been scanned, designed in CAD software, and then printed to the customer's requirements.[20] 3D models can be purchased from online marketplaces and printed by individuals or companies using commercially available 3D printers, enabling the home-production of objects such as spare parts and even medical equipment.[21][22] Uses Steps of forensic facial reconstruction of a mummy made in Blender by the Brazilian 3D designer Cícero Moraes. Outline See also: Environment artist The product is called a 3D model. For the best of both worlds, some artists use a combination of 3D modeling followed by editing the 2D computer-rendered images from the 3D model. Revit 2010 comes with a plethora of predefined materials, each of which can be modified to the user's desires. Revit Architecture, the industry standard from Autodesk, is .. In most cases, the artist retains ownership of the 3d model while the customer only buys the right to use and present the model. In 2005 Revit Structure was introduced, then in 2006 Revit MEP. There are artists sell their products directly in its own stores offering their products at a lower price by not using intermediaries. Concept Art Empire. There are a number of modeling techniques, including: Constructive solid geometry Implicit surfaces Subdivision surfaces Modeling can be performed by means of a dedicated program (e.g., Blender, Cinema 4D, LightWave, Maya, Modo, 3ds Max) or an application component (Shaper, Lofter in 3ds Max) or some scene description language (as in POV-Ray). Brighthub Engineering. ^ "How to Make 3D Models". With the release of Revit 2016, Autodesk dropped support for 32-bit Windows. Archived from the original on October 10, 2012. 3D Hubs. A Beginners Guide to 3D".

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