Useful Terms

[+] Coastal Terminology

ACCRETION Deposition of sediment, usually sand, which is evident by the seaward advance of a shoreline indicator, such as the high water line, berm crest, or vegetation line. Accretion causes the beach to become wider. Opposite of erosion.

AEOLIAN Transport and deposition of sand by wind; the principal means by which sand dunes are formed.

ALONGSHORE CURRENT See LONGSHORE CURRENT.

ARMORING Placement of fixed engineering structures, typically rock, wood timbers, or concrete, on or along the shoreline to reduce coastal erosion. Armoring structures include seawalls, revetments, bulkheads, and rip rap.

BACKSHORE Generally dry portion of the beach between the berm crest and the vegetation line that is submerged only during high water levels and eroded during storm events.

BACKWASH The seaward return flow of swash on the beach face due to gravity.

BAR Submerged mound of sand that generally runs parallel to the shore and causes waves to break before reaching the beach.

BARRIER BEACH A low-lying, sandy island or spit that lies offshore and generally parallel to the mainland.

BEACH Accumulation of wave-deposited, loose sediment, usually sand, that extends from the outermost breakers to the landward limit of wave and swash action.

BEACH LOSS Volumetric loss of sand, usually measured by a loss of dry beach width.

BEACH MONITORING Periodic collection of data, such as dry beach width, to study changes over time.

BEACH NARROWING Decrease in usable (dry) beach width caused by episodic storm impact or long-term erosion.

BEACH NOURISHMENT Sand artificially placed on the beach, usually by pumping sea bottom sediments onshore, to replace that being lost alongshore or offshore. Beach nourishment projects are usually large scale, spanning many miles of shoreline to rebuild eroded beaches.

BEACH PROFILE Measurement of the elevation or height of the beach surface taken along a line that runs from the dune to the water across the beach. Profiles taken at different dates can be compared to illustrate and quantify storm, seasonal, and longer-term changes in beach width, height, volume, and shape.

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BERM Feature usually located at mid-beach and characterized by a sharp break in slope, separating the flatter backshore from the seaward-sloping foreshore.

BLOWOUT Small, often circular or oval depression in sand dunes, caused by wind scouring where protective vegetation has been disturbed.

BLUFF High, steep bank or cliff along the mainland of non-coastal origin. Steepened bluffs are caused by wave undercutting of the cliff toe.

BREAKWATER Structure built parallel to the shoreline and seaward of the beach designed to protect the beach and upland areas by causing waves to break and dissipate their energy before reaching the shore.

BUILDING SETBACK State or locally required seaward limit of beachfront construction, usually for a house.

BULKHEADS Rigid structures with vertical walls built parallel to the shoreline to serve as barriers to wave attack and prevent storm surge flooding of upland areas; constructed out of treated wood, corrugated steel, PVC, or other materials.

COASTAL COMPARTMENT Stretch of shore that is connected by a common longshore sediment transport system, such as the south shore of Long Island, New York.

CUSPS Crenulated beach surface, characterized by an evenly spaced series of rounded, small headlands (projections) and bays (or embayments). The along-shore spacing of cusps ranges from a few feet to 100's of feet and their relief varies from a few inches to several feet.

DEFLATION Lowering of the beach profile.

DOWNDRIFT In the direction of net longshore sediment transport.

DUNE Mound or ridge of sand deposited by the wind, capable of movement when unvegetated. Dune building can be augmented by sand fencing or planting beach grass.

DUNE RESTORATION Technique of rebuilding an eroded or degraded dune through one or more methods (sand fill, fencing, revegetation, etc.).

DUNE WALKOVER Light construction that provides pedestrian access across a dune without trampling the vegetation.

EBB CURRENT Tidal current moving away from the coast during a falling (ebbing) tide, often with high velocity flows through tidal inlets.

EBB TIDAL DELTA Sandy shoals formed by ebbing currents found on the seaward side of tidal inlets.

EROSION Physical removal of sand from the beach which is transported offshore, alongshore, or into bays and lagoons via inlets. Erosion results in shoreline recession—landward retreat of a shoreline indicator such as the high water line, vegetation line or dune line. Opposite of accretion.

EROSION HOT SPOTS Areas where erosion is occurring at a much higher rate than adjacent beach areas, which can threaten beachfront development or infrastructure. Typically the dry beach has narrowed considerably.

EROSION WATCHSPOTS Areas where the coastal environment (natural or built) will soon be threatened if shore erosion trends continue.

EUSTATIC SEA-LEVEL RISE World-wide changes of sea level over decades to centuries caused by addition of water from the melting of glacial ice and/or thermal expansion of sea water due to global warming.

FETCH Distance of open water over which the wind blows in the development of waves. The fetch length can restrict wave development so that only relatively small waves occur in narrow bays and lagoons.

FLOOD CURRENT Tidal current moving toward the shore, through a tidal inlet, or up a tidal river, estuary, or lagoon.

FLOOD TIDAL DELTA Sandy shoals formed on a rising (flooding) tide and found on the estuarine or lagoonward side of a tidal inlet.

FORESHORE Seaward sloping portion of the beach within the normal range of tides.

GEOTEXTILE TUBES Elongated cloth bags or tubes made out of plastic material that can be stacked or arranged as a form of semi-hard coastal engineering.

GROINS Shore protection structures which extend from the beach backshore into the surf zone, perpendicular to the shoreline. A groin is intended to build up an eroded beach by trapping littoral drift or to retard the erosion of a stretch of beach. Often mis-identified as jetties.

HARDENING See ARMORING .

HARD STABILIZATION Emplacement of treated wood, rocks, concrete, PVC, and/or steel in the form of breakwaters, bulkheads, groins, jetties, seawalls, etc.

HIGH WATER LINE The line or “wetted bound” separating wet from dry sand and formed by swash uprush on the beach face.

HURRICANES Tropical cyclones with winds 75 mph or greater which spiral inward toward a core of low pressure and rotate in a counterclockwise direction in the Northern Hemisphere.

INLET See TIDAL INLET.

ISOSTATIC Local or regional changes in the ground surface elevation, resulting in land subsidence or uplift.

JETTIES Shore-perpendicular structures built at the sides of an inlet to maintain navigable waterways. They stabilize an inlet by intercepting the longshore transport of sand that would otherwise fill it in or cause the channel to shift position. Jetties are often confused with groins, but are much longer and more substantial structures, usually built in pairs.

LITTORAL BUDGET Sediment budget of the beach consisting of sources and sinks.

LITTORAL DRIFT Sand and coarser material moved in the breaker and swash zones by waves and longshore currents along the shoreline.

LITTORAL SYSTEM Area from the landward edge of the coastal upland (usually the dune) to the seaward edge of the nearshore zone.

LONGSHORE CURRENT Current moving along (parallel to) the shore, generated by waves breaking at an angle to the shoreline.

LONGSHORE SEDIMENT TRANSPORT Sediment transport along the beach (parallel to the shoreline) caused by longshore currents and/or waves approaching obliquely to the shoreline. See LITTORAL DRIFT.

MEAN SEA LEVEL The average elevation of the sea surface determined from tide gauges.

NEAP TIDE Small tide range, occurring at the first and third quarters of the moon, when the gravitational pull of the sun opposes that of the moon.

NEARSHORE Underwater area close to the beach, often characterized by sand bars, where sediment is actively being moved by waves and currents. This zone typically extends to a depth of 25 to 30 feet along the Atlantic coast.

NODAL POINT Location of longshore sediment transport divergence, where the littoral drift moves away in opposite directions along the coast. Normally areas of higher erosion rates.

NOR'EASTERS Extratropical storms with winds that commonly blow from the northeast, occur during the winter, and can generate large waves and elevated tides, resulting in considerable beach and dune erosion.

OBLIQUE WAVE APPROACH Waves that approach the beach at an angle (e.g., not straight-on) and generate longshore currents.

OFFSHORE Area seaward of the nearshore zone where sediment transport is only initiated by large swell waves or coastal storms.

OVERWASH Wave uprush overtopping the beach and dunes during storms; water and entrained sand that are moved landward of the dune. Also called an overwash surge during major events. See WASHOVER.

PEAT Dark-brown to black, fibrous material produced by plants which grow in marshes or bogs. When exposed on the beach face, it indicates long-term erosion and landward barrier migration.

PERIGEAN Period of time (twice a year) when the moon is at its closest approach to the Earth, and the tidal range is larger than normal.

PERIGEAN SPRING TIDES Coincidence of perigean and spring tidal conditions resulting in the highest high and the lowest low tides, Nor'easters, such as Ash Wednesday Storm of 1962, become even more damaging when they occur during perigean spring high tides.

PERIOD See WAVE PERIOD.

RECESSION Landward movement of the shoreline due to the loss of beach material and/or direct inundation of the land.

REFRACTION The bending of waves by bars and shoals that can cause the concentration of wave energy on a portion of the shoreline, resulting in accelerated beach erosion.

RELATIVE SEA LEVEL RISE The gradual rise in the water level relative to the land surface due to worldwide changes in the volume of seawater and/or local vertical movement of the land.

REVETMENT Facing of stone, concrete or rubble built to protect an embankment or upland against erosion by wave action or currents.

RIDGE A longshore feature that may become exposed at low tide; often formed by a bar moving onshore as a form of post-storm beach recovery.

RIP CURRENTS Strong, localized current flowing seaward from the shore; visible as an agitated band of water, which is the return movement of water piled up on the shore by incoming waves. Rip currents are by far the biggest killers of ocean swimmers.

RIPRAP Layer, facing or protective mound of stones randomly placed to prevent erosion of upland areas. Also the name of the stone so used.

RUNUP Part of the swash action caused by breaking waves.

SAND BAGS Sand-filled cloth or geo-textile bags that can be stacked to provide semi-hard coastal protection and are designed to retain sand while allowing water to flow through.

SAND WAVES Much larger features than cusps that may migrate along the shoreline. Sand waves can locally cause accelerated erosion known as erosion “hot spots.” Also called shoreline meanders, sand humps, or giant beach cusps.

SCARP Vertical drop-off of the dry beach caused by oblique wave attack during stormy conditions; beach scarps can be several inches to over six feet high and disappear by the return of sand onshore during berm accretion. Dunes can also be scarped, forming vertical, wave-cut faces.

SCOUR Removal of beach material by waves and currents such as at the base of a dune or toe of a shore structure.

SCARPING Erosion of a dune or berm, usually by oblique wave attack during a storm.

SEA Short period, steep waves generated during a storm that cause beach erosion.

SEAWALLS Vertical or near vertical shore-parallel structures designed to prevent upland erosion and storm surge flooding. Seawalls are generally massive concrete structures emplaced along a considerable stretch of shoreline at urban beaches.

SHADOW EFFECT Stretch of sand-starved, eroded beach that is downdrift of a structure such as a jetty or groin and hence in the littoral drift “shadow” of that structure.

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SHOAL A large deposit of sand, generally created by currents near inlets, that can be an obstruction to boats and can cause wave refraction.

SHORELINE Boundary between the land and the sea, which is often defined as the mean high water line for mapping purposes.

SOFT STABILIZATION Artificial emplacement of sand via beach nourishment or through building and enhancement of sand dunes with sand fencing or vegetative plantings. Sand scraping of the beach to build up sand dunes is another means of “soft stabilization”.

SORT Separation of particles into various size categories by moving water or wind.

SPOIL Dredged sediment, usually from inlets or lagoons, that can be clean or polluted.

SPRING TIDE Larger than average tidal range that occurs twice monthly during new and full moon times.

STORM SURGE Sudden, temporary rise of sea level primarily due to winds but also caused by atmospheric pressure reduction, resulting in piled-up water against the coast, which is the primary cause of coastal flooding during a storm.

SWASH Sheet of water that flows up and down the beach foreshore caused by waves breaking and gravity, respectively. See UPRUSH and BACKWASH .

SWELL Long period waves that tend to widen the dry beach, usually in summer months or during fairweather.

TIDAL INLET Channel through a barrier beach, which is characterized by swift currents that interrupt the littoral drift of sand.

TIDAL PRISM Amount of water that flows in and out of a semi-enclosed bay or estuary between high and low tide.

TIDAL RANGE Difference in height between high and low tide.

UNDERTOW General layman’s term used to describe coastal currents which may “suck” swimmers underwater. A more accurate description is backwash from large breaking waves or seaward-flowing rip currents.

SEMI-HARD STABILIZATION Use of sand bags and/or geotextile tubes that can be stacked or arranged to provide protection to beachfront properties.

UPDRIFT Direction opposite that of the predominant movement of the littoral drift. Opposite of downdrift.

UPLAND Mainland or land behind the dunes; high ground that is above normal tidal flooding.

UPRUSH The movement of water (swash) up the beach face when a wave breaks on the foreshore.

WASHOVER OR WASHOVER FAN Sand deposited during storms landward of the dune line, sometimes extending to the marshes or into the bay waters.

WAVE HEIGHT Vertical difference between a wave's crest and trough; higher waves are more energetic and can cause rapid beach changes.

WAVELENGTH Distance between successive wave crests.

WAVE PERIOD Time in seconds between successive wave crests. Swell are long period, while sea are short period waves.

WAVE REFRACTION See REFRACTION .

[+] GIS Terminology

AAT Arc Attribute Table. A table containing attributes for a line coverage such as streets or streams.

ACCURACY, ABSOLUTE The accuracy of a map in representing the geographic location of an object relative to its true location on the surface of the Earth. Absolute accuracy is based on geographic coordinates.

ACCURACY, RELATIVE The accuracy of a map in representing the geographic location of an object relative to the locations of other objects.

AM/FM Automated Mapping and Facilities Management. The management of mapping and facilities management using integrated computer software.

AML The ARC Macro Language. A high level language that provides full programming capabilities and a set of tools for building menus to tailor user interfaces for specific applications.

ANNOTATION Descriptive text used to label coverage features.

ARC A string of x,y coordinate pairs (vertices) that begin at one location and end at another.

CONNECTING the arc's vertices creates a line.

ATTRIBUTE A characteristic of a geographic feature described by numbers or letters, typically stored in tabular format and linked to the feature in a relational database. The attributes of a well represented by a point might include depth, location, and permit number.

BASE MAP A map containing visible surface features and boundaries, essential for locating additional layers, or types, of georeferenced information.

BUFFER A zone of a specified distance around coverage features. Both constant and variable width buffers can be generated for a set of coverage features based on each features attribute values.

CAD Computer Aided Design. An automated system for the design, drafting and display of graphically oriented information.

CADASTRE Public record of the extent, value and ownership of land within a district for purposes of taxation.

CARTESIAN COORDINATE SYSTEM A two dimensional coordinate system in which x measures horizontal distance and y measures vertical distance. An x,y coordinate defines every point on the plane.

CLIP The spatial extraction of those features from one coverage that reside entirely within the boundary defined by features in another coverage. Clipping works much like a cookie cutter.

COGO Abbreviation for the term COordinate GeOmetry. Land surveyors use COGO functions to enter survey data, to calculate precise locations and boundaries, to define curves, and so on.

CONTOUR line An imaginary line joining points of equal elevation.

CONTROL points A set of points on the ground whose horizontal and vertical location is known. Control points are used as the basis for detailed surveys.

COORDINATE An x,y location in a Cartesian coordinate system or an x,y,z coordinate in a three dimensional system. Coordinates represent locations on the Earth's surface relative to other locations.

COVERAGE A digital version of a map forming the basic unit of vector data storage in ARC/INFO. A coverage stores map features as primary features (such as arcs, nodes, polygons, and label points) and secondary features (such as tics, map extent, links, and annotation). Associated feature attribute tables describe and store attributes of the map features. A coverage usually represents a single theme, or layer, such as soils, roads, or land use.

COVERAGE UNITS The units (e.g., feet, meter, inches) of the coordinate system in which a coverage is stored.

DATA CONVERSION The translation of data from one format to another. ARC/INFO supports data conversion from many different geographic data formats in addition to routines for converting paper maps. Those data formats include DLG, TIGER, DXF, and DEM.

DATABASE A logical collection of interrelated information, managed and stored as a unit. A GIS database includes data about the spatial location and shape of geographic features recorded as points, lines, and polygons as well as their attributes.

DATUM A set of parameters and control points used to accurately define the three dimensional shape of the Earth. The corresponding datum is the basis for a planar coordinate system.

DBMS Data Base Management System. Software that manages, manipulates and retrieves data in a database.

DGPS Differential Global Positioning System. A positioning procedure that uses two receivers, a rover at an unknown location and a base station at a known, fixed location. The base station computes corrections based on the differences between its actual and observed ranges to the satellites being tracked.

DIGITAL map library A series of directories and subdirectories designed to uniformly organize a collection of spatial data. Map libraries organize geographic data spatially as a set of tiles and thematically as a set of layers.

DIGITAL ELEVATION MODEL (DEM) Terrain elevation data organized by quadrangle and provided in digital form.

DIGITAL TERRAIN MODEL (DTM) A three-dimensional model of the Earth's surface, provided in digital form.

DIGITIZE To encode map features as x,y coordinates in digital form. Lines are traced to define their shapes. This can be accomplished either manually or by use of a scanner.

DISSOLVE The process of removing boundaries between adjacent polygons that have the same values for a specified attribute.

DLG Digital Line Graph files from the U.S. Geological Survey.

DXF Data Exchange Format. A format for storing vector data in ASCII or binary files; used by AutoCad or other CAD software and convertible to ARC/INFO coverages.

EDGE matching An editing procedure to ensure that all features that cross adjacent map sheets have the same edge locations.

ETHERNET A baseband protocol invented by the Xerox Corporation in common use as the local area network for UNIX operating systems interconnected by TCP/IP. Runs at 16 megabits per second.

FEATURE ATTRIBUTE TABLE A table used by ARC/INFO to store attribute information for a specific coverage feature class. Feature attribute tables supported include:

Cover.PAT for polygons or points
Cover.AAT for arcs
Cover.NAT for nodes
Cover.RAT for routes
Cover.SEC for sections
Cover.TAT for annotation(text)
- where "Cover" is the coverage name

FEATURE CLASS The type of feature represented in a coverage. Coverage feature classes include arcs, nodes, label points, polygons, tics, annotation, links, boundaries, routes, and sections.

GEOCODE The process of identifying a location by one or more x,y coordinates from another location description such as an address.

GIS Geographic Information System. An organized collection of computer hardware, software, geographic data, and personnel designed to efficiently capture, store, update, manipulate, analyze, and display all forms of geographically referenced information.

GLOBAL POSITIONING SYSTEM (GPS) A satellite based device that records x,y,z coordinates and other data. GPS devices can be taken into the field to record data while driving, hiking, or flying. Ground locations are calculated by signals from satellites orbiting the Earth.

INFO A tabular DBMS used by ARC/INFO to store and manipulate feature attribute and related tables.

INTERSECT The topological integration of two spatial data sets that preserves features that fall within the spatial extent common to both input data sets.

ITEM In an attribute table, a field of information commonly displayed as a column. A single attribute from a record in an INFO data file.

LATITUDE-LONGITUDE A spherical reference system used to measure locations on surface. Latitude measures angles in the north south direction and longitude measures angles in the east west direction.

LAYER A logical set of thematic data described and stored in a map library. Layers organize a map library by subject matter, e.g., soils, roads, wells, and extend over the entire geographic area defined by the spatial index of the map library.

LINE-IN-POLYGON A spatial operation in which arcs in one coverage are overlaid with polygons in another to determine which arcs, or portions of arcs, are contained within the polygons. Polygon attributes are associated with corresponding arcs in the resulting line coverage.

LOGICAL SELECTION The process of selecting a subset of features from a coverage using logical selection criteria that operate on the attributes of coverage features (e.g., area greater than 16,000 square feet). Only those features whose attributes meet the selection criteria are selected. Also known as feature selection by attribute.

MANY-TO-ONE-RELATE A relate in which many records in one table are related to a single record in another table. A goal in relational database design is to use one to many relates to reduce data storage and redundancy.

MAP EXTENT The rectangular limits (xmin,ymin,xmax,ymax) of the area of the Earth's surface you want to display using ARC/INFO. The geographic extent specified by the minimum bounding rectangle of a study area.

MAP PROJECTION A systematic conversion of locations on the Earth's surface from spherical to planar coordinates. Several of the more popular projections are: State Plane Coordinates (SPC) which uses feet for units of measure; Universal Transverse Mercator (UTM) which uses meters for units of measure; and latitude and longitude which uses degrees, minutes, and seconds of arc for units of measure.

MAP SCALE The extent of reduction needed to display a representation of the Earth's surface on a map. A statement of a measure on the map and the equivalent measure on the Earth's surface, often expressed as a representative fraction of distance, such as 1:24,000 (one unit in the map equals 24,000 units on the ground).

ONE-TO-MANY-RELATE A type of relate connecting a unique value in one file to many records (that have the same value) in another file.

ORTHOPHOTOGRAPHY The process of aerial photographs that have been rectified to produce an accurate image of the Earth by removing tilt and relief displacements which occurred when the photo was taken.

PAT Point Attribute Table. Polygon Attribute Table. A coverage can have either a point attribute table or a polygon attribute table, but not both.

PHOTOGRAMMETRY The science of deducing the physical dimension of objects from measurements on photographs.

PLANIMETRIC The horizontal (x,y) locations of non-topographic features, such as rivers, lakes, buildings, roads, etc.

POINT-IN-POLYGON A spatial operation in which points from one coverage are overlaid with a polygonal coverage to determine which points fall within the polygon boundaries. Points assume the attributes of the polygons within which they fall.

POLYGON A multisided figure that represents area on a map. A feature defined by the arcs that make up its boundary. Every polygon contains one label point within its boundary. Polygons have attributes that describe the geographic feature they represent.

POLYGON OVERLAY A process that merges spatially coincident polygons from two coverages, and their attributes, to create a third coverage, that contains new polygons and describes new relationships.

QUADRANGLE (quad) Typically refers to a map sheet published by the U.S. Geological Survey, a 7.5 minute quadrangle series or the 15 minute quadrangle series. Also known as a topographic or topo map.

RASTER Data displayed as discrete picture elements (pixels).

RELATE An operation that establishes a temporary connection between corresponding records in two tables using an item common to both. A relate gives access to additional feature attributes that are not stored in a single table.

RELATE KEY The common set of columns used to relate two attribute tables.

REMOTE SENSING Any of the technical disciplines for observing and measuring the Earth from a distance, including satellite imaging, Global Positioning Systems, RADAR, SONAR, aerial photography, etc.

RESOLUTION Measures the sharpness of an image.

SELECTIVE AVAILABILITY (S/A) A U.S. Department of Defense program to limit the accuracy of autonomous position fixes computed by civilian receivers. The error in position caused by S/A can be up to 100 meters.

SLOPE A measure of change in surface value over distance, expressed in degrees or as a percentage. For example, a rise of 2 meters over distance of 100 meters describes a 2% slope.

SPATIAL ANALYSIS The process of modeling, examining, and interpreting model results. Spatial analysis is the process of extracting or creating new information about a set of geographic features. Spatial analysis is useful for evaluating suitability and capability, for estimating and predicting, and for interpreting and understanding. In GIS there are four traditional types of spatial analysis: spatial overlay and contiguity analysis, surface analysis, linear analysis, and raster analysis.

SPATIAL MODELING Analytical procedures applied with GIS. There are three categories of spatial modeling functions that can be applied to geographic data within a GIS: geometric models, such as calculating the distance between features, generating buffers, calculating areas and perimeters, and so on; coincidence modeling, such as polygon overlay; and adjacency modeling such as redistricting and allocation.

SQL Structured Query Language. A syntax for defining and manipulating data from a relational database. Developed by IBM in the 1970s, it has become an industry standard for query languages in most relational database management systems.

STATE PLANE COORDINATES (SPC) A map projection that measures distance in feet. By providing an SPC easting (x) and northing (y), the state name, and the zone number, any location in the United States can be identified by a unique coordinate value. SPC Zone boundaries follow state and county boundaries. State Plane Coordinates are admirably suited to the needs of the local land surveyor and are widely used for public works, land surveys, and for Geographic Information Systems.

TIN Triangulated Irregular Network. A series of triangles constructed using elevation data points taken from coverages. These triangles are used for surface representation and display.

TOPOGRAPHY Shape or configuration of the land surface; represented in map form by contour lines.

TOPOLOGY The spatial relationships between connecting or adjacent coverage features.

TRANSFORMATION The process that converts coordinates from one coordinate system to another through translation, rotation, and scaling.

TRIANGULATION A method of surveying in the location of an object may be calculated from the known locations of two other objects. Creating a triangle from the three items, the angles and sides of the triangle can be measured and the location of the unknown object is calculated algebraically.

VECTOR A geometric element, stored as a point with x,y coordinates within a computer database.

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