

# LOFTING A BOAT A STEP BY STEP MANUAL Textbook

## Lofting a boat a step by step manual

Lofting a boat is an essential process for boat builders and enthusiasts aiming to create precise and accurate hulls. Lofting involves drawing the full-sized shape of the boat on a lofting floor to ensure the design's accuracy before construction begins. This meticulous process helps prevent errors, ensures symmetry, and results in a well-proportioned vessel. Whether you're building a small sailboat or a large yacht, understanding the step-by-step process of lofting is crucial for achieving professional results. In this manual, we will walk you through each stage of lofting a boat with clear instructions and tips to make your project successful.

## Understanding Lofting and Its Importance

Before diving into the steps, it's vital to understand what lofting entails and why it's critical in boat construction.

### What is Lofting?

Lofting is the process of transferring the boat's lines from scaled drawings or plans onto a full-sized surface or floor. This allows builders to visualize the shape, check measurements, and make adjustments before cutting or assembling materials.

### Why Lofting Matters

- Ensures accuracy and symmetry of the hull
- Prevents costly mistakes during construction
- Allows for detailed inspection of the design
- Facilitates precise measurement and marking

## Tools and Materials Needed for Lofting

Having the right tools and materials makes the lofting process smoother and more accurate.

### Tools

- Lofting table or floor space (smooth, flat surface)
- Full-sized or scaled drawings of the boat lines
- Straightedge or T-square
- French curves or flexible curves
- Rulers and measuring tapes
- Pencils, markers, or chalk for marking
- Plumb bob or laser level
- String or chalk line
- Clamps or weights to hold paper or templates

## Materials

- Drawing paper or lofting cloth
- Plans or templates of the boat's lines
- Adhesive tape or masking tape
- Reference points (stakes, nails, or markers)

## Preparing the Lofting Area

The foundation of a successful lofting process is a clean, flat, and well-organized workspace.

### Steps to Prepare Your Lofting Area

- Choose a spacious, well-lit area with a flat, level floor.
- Ensure the surface is clean, smooth, and free of debris.
- Mark the centerline of the lofting area, which will serve as the primary guide.
- Lay out your drawings or plans on the floor, ensuring they are scaled correctly and laid flat.
- Secure any templates or scaled drawings with tape to prevent movement during marking.

## Step-by-Step Process of Lofting a Boat

Now, let's walk through the detailed steps involved in lofting a boat from start to finish.

### Step 1: Establish the Baseline and Centerline

- Identify the point of symmetry on your plans, usually the keel line.
- Use a measuring tape or ruler to mark the centerline along the length of your lofting floor.
- Draw a straight, clear baseline using a chalk line or a straightedge, ensuring it's perfectly

aligned.

- Mark key reference points along this baseline, such as the bow, stern, and station points.

## Step 2: Transfer the Boat Lines onto the Lofting Floor

- Using your scaled plans, trace out the station lines, waterlines, and buttocks onto paper or directly onto the lofting floor.
- For accuracy, use a flexible curve or French curves to trace smooth curves of the hull sections.
- Label each line clearly with station numbers and waterline heights.
- If working with scaled drawings, transfer measurements proportionally to full size.

## Step 3: Mark the Stations and Waterlines

- From the baseline, measure the distances to mark each station and waterline on the lofting floor.
- Use a ruler or tape measure for precise placement.
- Connect the station marks using a flexible curve to form the stations' lines.
- Repeat for waterlines, ensuring they are level and accurately placed.

## Step 4: Draw the Lengthwise and Crosswise Curves

- Draw the sheer line?the top edge of the hull?by connecting the highest points of each station along the length.
- Mark the keel line along the centerline, running from bow to stern.
- Using French curves, draw the buttocks (vertical slices) and waterlines to complete the shape of the hull.

## Step 5: Verify the Accuracy of the Lines

- Check measurements against your plans to ensure each station and waterline matches the intended dimensions.
- Use a plumb bob or laser level to confirm vertical alignment of key points.
- Look for smooth, continuous curves; make adjustments as necessary.

## Step 6: Transfer the Lofted Lines to Templates or Materials

- If you plan to create templates for cutting hull panels, trace the lofted lines onto plywood or other suitable material.
- Cut out the templates carefully, ensuring they match the full-sized lofted lines.
- Use these templates to mark your construction materials or for further shaping processes.

## Additional Tips for Successful Lofting

- Double-check all measurements before finalizing lines.
- Work patiently and methodically to avoid errors.
- Use high-quality tools for precise measurements and drawing.
- Maintain a clean workspace to prevent confusion or mistakes.
- Consult your boat plans regularly to ensure fidelity to the original design.

## Common Mistakes to Avoid in Lofting

- Rushing measurements; accuracy is key.
- Using scaled drawings without verifying scale conversion.
- Not securing templates, causing shifts during marking.
- Ignoring the importance of verifying measurements with actual plans.
- Failing to label lines clearly, leading to confusion during construction.

## Conclusion

Lofting a boat is a foundational skill that combines precision, patience, and a good understanding of naval architecture. By following this step-by-step manual, you can accurately transfer your boat's design onto a full-sized surface, setting the stage for successful construction. Remember, meticulous attention to detail during lofting will translate into a well-proportioned, seaworthy vessel. Whether you're building as a hobbyist or professionally, mastering the lofting process will greatly improve the quality and accuracy of your boatbuilding projects. Happy lofting!

### Lofting a Boat: A Step-by-Step Manual for Accurate and Effective Boat Design

Lofting a boat is a fundamental skill in traditional boatbuilding and naval architecture. It involves transforming the boat's scaled plans into full-sized, precise drawings on a lofting floor, ensuring that every curve, line, and measurement aligns perfectly with the intended design. Proper lofting provides the blueprint for cutting and assembling the hull, ensuring structural integrity, aesthetic accuracy, and safe seaworthiness. Whether you're an aspiring boatbuilder, a seasoned craftsman, or an enthusiast seeking a thorough understanding, mastering the lofting process is essential. This comprehensive guide walks you through each phase of lofting a boat, from initial preparation to final

verification.

## Understanding the Importance of Lofting

Before diving into the step-by-step process, it's crucial to appreciate why lofting is such a vital stage in boatbuilding:

- Accuracy in Design Translation: Lofting translates scaled plans into full-size drawings, ensuring the boat's dimensions and curves are precisely realized.
- Ensuring Fairness: Proper lofting guarantees that the hull lines are smooth, fair, and true to the design, which is critical for performance and aesthetics.
- Structural Integrity: Accurate lofting helps in aligning frames, ensuring proper spacing, and fitting components seamlessly.
- Efficiency: A well-executed loft reduces errors during construction, saving time and materials.

## Preparation Phase: Gathering Tools and Materials

A successful lofting project depends on meticulous preparation. Gather the following tools and materials:

### Tools

- Lofting floor or workspace: A large, flat, and smooth surface?preferably a dedicated lofting floor or a flat, smooth concrete surface.
- Drawing tools:
  - Long, straight batten or ruler (preferably 10-20 feet for larger boats)
  - Flexible curves or French curves for fairing lines
  - Compasses and dividers
  - T-squares and framing squares
  - Pencils (preferably non-smudging or erasable)
  - Marking pens or markers
- Measuring equipment:
  - Steel tape measure
  - Calipers for small measurements
  - Level or plum bob for vertical alignment
- Reference plans: Accurate, scaled drawings of the boat's hull, sections, and lines.

### Materials

- Lofting paper or marking surfaces: Chalk, pencil, or marker suitable for marking on the lofting surface.
- String and weights: For straight lines and to maintain tension.
- Templates or templates materials: Cardboard or plywood for creating station templates.
- Markers or paints: For highlighting key lines and measurements.

## Step 1: Preparing the Lofting Floor

The foundation of good lofting begins with a well-prepared workspace:

- Clear and Clean: Ensure the lofting floor or workspace is clean, flat, and free of debris.
- Mark Reference Lines: Draw reference lines along the length and width of the floor:
  - Centerline (Longitudinal axis): Mark the boat's centerline with a chalk line or a straight batten.
  - Waterline and station lines: Mark the baseline (keel line), waterline, and other critical reference points based on the plans.
- Establish the Frame of Reference: Use a long straightedge or batten to establish a baseline for measurements.
- Identify Station Points: Mark the stations (cross-sectional points) according to the scaled plans, ensuring their positions are accurate.

## Step 2: Transferring the Plans to Full Size

This step involves scaling and plotting the boat's lines from the drawings onto the lofting floor:

### 2.1 Understanding the Plans

- Familiarize with the plans: Review all drawings, including body plan, half-breadth plan, and profile.
- Identify the key lines: Waterline, stations, buttocks, and sheer lines.

### 2.2 Scaling

- Determine the scale: For example, 1/4 inch = 1 foot, or as specified in your plans.
- Use a scale ruler or proportional dividers to transfer scaled measurements to full size.

### 2.3 Transfer Key Points

- Plot stations: Mark each station line on the lofting floor at the correct distances from the baseline.
- Mark stations? intersections: At each station, mark the corresponding points for the hull?s curves?half-breadths, body lines, and buttocks.

## Step 3: Drawing the Lines

Once key points are transferred, proceed to connect them to form the hull lines:

### 3.1 Drawing the Body Plan (Sections)

- Mark station shapes: At each station, draw the shape of the hull cross-section.
- Use templates or freehand: For complex curves, use flexible curves or French curves to ensure smooth fairing lines.

### 3.2 Drawing the Half-Breadth and Profile

- Half-breadth plan: Draw the width of the hull at each station.
- Profile view: Draw the side elevation, including the keel, waterline, and sheer line.

### 3.3 Connecting the Lines

- Fair the curves: Use flexible curves or long battens to connect points smoothly, avoiding bumps or irregularities.
- Check for fairness: Regularly step back to ensure the lines are fair and smooth, adjusting as necessary.

## Step 4: Establishing the Fair Lines

Fair lines are the smooth, continuous curves that define the hull?s shape:

- Use flexible curves: To draw fair lines that pass through all the key points without sharp angles.
- Check with a straightedge: Ensure the curves are fair and consistent.
- Mark the lines clearly: Use different colors or line styles to distinguish between waterlines, stations, and buttocks.

## Step 5: Verifying and Cross-Checking

Accuracy is paramount. Verify your lofted lines with the original plans:

### 5.1 Cross-Check Measurements

- Compare points: Re-measure key points against scaled measurements.
- Check symmetry: Use a mirror or fold the plan to verify bilateral symmetry.

### 5.2 Use Templates and Offsets

- Templates: Create full-scale templates for complex curves to verify the lofted lines.
- Offsets: Measure offsets from the centerline to ensure consistent spacing.

### 5.3 Final Fairness Check

- Use a straight bat or string: To check the fairness of the curves.
- Mark problem areas: Adjust curves as needed for smoothness and accuracy.

## Step 6: Finalizing the Lofted Lines

Once satisfied with the fairness and accuracy:

- Darken the lines: Use a marker or a darker pencil to finalize the hull lines.
- Label each line: Clearly mark waterlines, station lines, buttocks, and sheer lines for easy reference during construction.
- Add reference points: Mark key measurements, station numbers, and other relevant data.

## Step 7: Transferring Lofted Lines to Construction Material

The finalized lofting drawings serve as templates for cutting materials:

- Create full-size templates: Use the lofted lines to cut cardboard or plywood templates.
- Trace onto planking or frames: Use the templates to mark your actual building materials.
- Number and organize: Keep templates and plans organized for efficient construction.

## Additional Tips and Best Practices



- Patience is key: Lofting requires precision and patience; rushing can lead to inaccuracies.
- Use quality tools: Sharp pencils, flexible curves, and accurate measuring instruments improve results.
- Maintain consistency: Always double-check measurements and fairness.
- Work in good lighting: Proper illumination helps detect irregularities.
- Document your process: Keep records of measurements and adjustments for future reference.

## Common Challenges and How to Overcome Them

- Uneven surfaces: Ensure the lofting floor is perfectly flat; use leveling tools if necessary.
- Shifts or misalignments: Regularly verify the alignment of reference lines.
- Fairness issues: Use flexible curves and step back frequently to evaluate the curves.
- Scaling errors: Double-check the scale before transferring measurements.

## Conclusion: The Art and Science of Lofting

Lofting a boat is both a technical craft and an artistic endeavor. It combines precision measurement, geometric understanding, and aesthetic judgment to produce a set of accurate, fair lines that form the blueprint for a seaworthy vessel. Mastery of this process ensures that the final build adheres closely to the design intent, optimizes performance, and demonstrates craftsmanship.

Remember, patience, practice, and meticulous attention to detail are your best allies in the lofting process. With each hull you loft, your skills will improve, bringing you closer to creating beautiful, functional boats that stand the test of time. Whether building a small dinghy or a large yacht, the principles outlined in this step-by-step manual provide a solid foundation for achieving excellence in boat lofting.

**Question** What is lofting a boat and why is it important? Lofting a boat involves enlarging scaled drawings of the boat's design to full size on a lofting table, ensuring precise measurements for construction. It is crucial for accuracy, proper alignment, and building a boat that matches the design specifications. **What materials and tools are needed for lofting a boat?** You will need large sheets of brown kraft paper or plywood for the lofting surface, measuring tapes, straightedges, French curves, a pencil, a ruler, a scribe, and weights or pins to hold patterns in place. A level and a plumb bob are also useful for accuracy. **How do I prepare the lofting surface for drawing?** Choose a flat, smooth workspace free of debris. Mark the baseline and waterlines accurately, and ensure the surface is level. You may mark grid lines for reference and set up a consistent reference point for all measurements. **What are the key steps involved in lofting a boat?** The main steps include: 1) Transferring the design lines onto the lofting surface, 2) Drawing the baseline, waterlines, and station lines, 3) Scaling up the lines accurately, 4) Connecting the points smoothly, and 5) Verifying measurements and symmetry before transferring to the construction framework. **How can I ensure**

accuracy during the lofting process? Use precise measurements, double-check all dimensions, employ a consistent scale, and verify symmetry by measuring both sides. Using tools like a French curve and straightedge helps maintain smooth, accurate lines. Regularly cross-reference with original plans. What are common mistakes to avoid when lofting a boat? Common mistakes include misreading or misscaling the plans, skipping verification steps, uneven drawing surfaces, inaccurate measurements, and rushing the process. Taking time to double-check each step ensures better accuracy. How do I transfer the lofted lines to the actual boat building framework? After completing the lofting, mark key points and lines clearly, then use those to set up stations and bulkheads on the actual framework or molds. Transferring measurements carefully ensures the boat's shape matches the lofted design. Are there digital tools that can assist with lofting a boat? Yes, CAD software and 3D modeling programs can help create accurate boat plans and facilitate digital lofting. These tools can reduce errors, allow easy scaling, and enable virtual verification before physical lofting begins.

**Related keywords:** boat lofting, boat building, lofting techniques, hull design, lofting plan, boat construction, lofting tools, boat modeling, boat drawing, maritime craftsmanship

## parts of a boat diagram for kids

**Parts of a boat diagram for kids** are fascinating to learn about because they help us understand how boats work and how they stay afloat on the water. Whether you're a young boat enthusiast or just starting to explore marine transportation, knowing the different parts of a boat is essential. In this article, we'll explore the main components of a boat diagram for kids, explaining each part in a simple and easy-to-understand way.

## Introduction to Boats and Their Parts

Boats are watercraft designed to travel on water. They come in many shapes and sizes, from small rowboats to large ships. Every boat has specific parts that help it move, stay balanced, and carry people or goods safely. By understanding these parts, kids can better appreciate how boats work and even help in boat safety and maintenance.

## Basic Parts of a Boat Diagram for Kids

Let's start by looking at the main parts of a typical boat. These are the essential components that make a boat functional and safe.

### 1. The Hull

The hull is the main body of the boat. It is the part that sits in the water and provides buoyancy, helping the boat stay afloat. The shape of the hull affects how the boat moves and how stable it is.

## **2. The Deck**

The deck is the flat surface on top of the hull where people can stand or sit. It acts like a floor and provides space for passengers and crew.

## **3. The Bow**

The bow is the front part of the boat. It cuts through the water and helps the boat move forward smoothly.

## **4. The Stern**

The stern is the back end of the boat. It often contains the engine and the steering controls.

## **5. The Keel**

The keel is a long, narrow piece that runs along the bottom of the hull from the front to the back. It helps keep the boat stable and prevents it from tipping over.

## **6. The Mast**

On sailboats, the mast is a tall pole that holds the sails. It helps catch the wind to move the boat.

## **7. The Sails**

Sails are large pieces of fabric attached to the mast that catch the wind, propelling the boat forward.

## **8. The Rudder**

The rudder is a flat piece located at the stern that helps steer the boat. It turns to change the direction of the boat.

## **9. The Propeller**

The propeller, or "prop," is a rotating blade at the back of engine-powered boats. It pushes water backward to move the boat forward.

## **10. The Outboard Motor**

An outboard motor is a small engine attached to the stern that powers the boat, especially in small boats.

## 11. The Cabin

Some boats have a cabin ? an enclosed space where passengers can sit, rest, or sleep.

## Understanding Boat Parts with a Diagram

A boat diagram for kids is a helpful tool for visual learning. It shows where each part is located and how they work together. When looking at a diagram, you can see the hull in the middle, the mast and sails on top (for sailboats), and the rudder and propeller at the back.

### How to Read a Boat Diagram

- Identify the main body (hull): This is the foundation of the boat.
- Locate the bow and stern: Front and back, respectively.
- Find the mast and sails: Usually on the middle or front part of sailboats.
- Look for the rudder and propeller: Usually at the stern, at the back end.
- Notice the keel: Running along the bottom of the hull, underneath the boat.

## Different Types of Boats and Their Parts

Not all boats have the same parts. Let's look at some common types:

### Sailboats

- Have a hull, deck, mast, sails, rudder, and keel.
- Rely on wind power for movement.

### Motorboats

- Have a hull, deck, outboard motor, propeller, rudder, and sometimes a cabin.
- Use engines to move.

### Rowboats

- Have a hull, seat(s), oars, and a simple rudder.
- Powered by human effort.

## Fun Facts About Boat Parts

- The keel not only helps with stability but also prevents the boat from sliding sideways in the water.
- Sails can be adjusted to catch more or less wind, helping control the speed of a sailboat.
- The rudder acts like a steering wheel, turning the boat left or right.
- The propeller is similar to a giant screw that pushes the boat forward.

## Safety Tips for Kids Around Boats

Knowing the parts of a boat also helps in understanding safety:

- Always wear a life jacket when near or on a boat.
- Do not lean over the side to avoid falling into the water.
- Listen to the boat captain or adult in charge.
- Understand the function of the rudder and propeller to stay safe, especially around moving parts.

## Conclusion

Understanding the parts of a boat diagram for kids is a fun and educational way to learn about how boats work. From the hull that keeps the boat afloat to the sails that catch the wind, each part plays a vital role. By familiarizing yourself with these components, you can better appreciate the fascinating world of boats and water travel. Whether you're imagining sailing across the seas or just exploring your local lake, knowing these parts will make your adventures more exciting and safe!

Understanding the parts of a boat diagram for kids is a fantastic way to introduce young learners to the fascinating world of boats and how they work. Whether you're a parent, teacher, or simply a curious kid, exploring the different components that make up a boat can be both fun and educational. A clear and colorful boat diagram can serve as a visual aid to help kids grasp the basic parts, their functions, and how they work together to keep a boat afloat and moving on the water.

### Why Learning the Parts of a Boat Diagram for Kids Matters

Before diving into the details, it's important to understand why familiarizing children with boat parts through diagrams is valuable:

- Enhances Visual Learning: Kids often learn best with visual aids. A well-designed diagram simplifies complex information.
- Builds Basic Engineering Knowledge: Understanding how boats are built fosters curiosity about engineering and design.
- Encourages Safety Awareness: Knowing the parts of a boat helps children understand safety features and proper boat use.
- Stimulates Imagination: Visualizing boat components can inspire stories, play, and further exploration of marine environments.

### Basic Components of a Boat: An Overview

A typical boat diagram for kids highlights the main parts that make a boat functional and safe. These parts can be grouped into categories such as the hull, the deck, the steering and control systems, and the engine or motor.

### The Hull ? The Body of the Boat

The hull is the main body of the boat, acting as its foundation. It is designed to float on water and support the boat's weight.

- Types of Hulls:
  - Displacement hulls (move through water)
  - Planing hulls (glide on top of water)
- Parts of the Hull:
  - Bow: The front part of the boat that cuts through the water.
  - Stern: The back end of the boat.
  - Sides: The left and right parts of the hull.
  - Bottom: The part of the hull that touches the water.

### The Deck ? The Surface You Walk On

The deck is the top surface of the boat, providing space for people to stand, sit, and perform tasks.

- Main parts of the Deck:
  - Cockpit: The area where the steering wheel and controls are located.
  - Cabin: An enclosed space below deck for shelter or storage.
  - Gunwales: The upper edges of the sides of the hull, often used as handrails.

## Steering and Control Parts

Control parts help navigate and steer the boat safely.

- Steering Wheel or Helm: The device used by the captain to turn the boat.
- Rudder: A flat piece at the back that turns to change the boat's direction.
- Steering Linkage: Connects the wheel to the rudder.
- Throttle: Controls the speed of the engine.

## The Engine or Motor

Most boats are powered by an engine or motor, which propels the boat forward.

- Outboard Motor: Attached outside the stern, easy to move or repair.
- Inboard Engine: Located inside the hull, connected to a propeller.
- Propeller: The rotating blades that push water to move the boat.

## Additional Important Parts of a Boat Diagram for Kids

Beyond the main components, several other parts are crucial for safety and functionality.

## Safety and Utility Parts

- Life Jackets: Personal flotation devices for safety.
- Anchor: A device used to keep the boat stationary in water.
- Mooring Lines: Ropes used to tie the boat to docks or buoys.
- Fenders: Bumpers to prevent damage when docked.

## Navigation and Communication

- Compass: Helps determine direction.
- Radio: For communication, especially in emergencies.
- Lights: Navigation lights to see and be seen at night.

## Visualizing a Boat Diagram for Kids

A well-designed boat diagram for kids typically features colorful labels, simple illustrations, and clear

demarcations of each part. Here's a suggested breakdown that you might find on such a diagram:

#### Front (Bow)

- Label showing the bow.
- Illustration of the bow cutting through water.

#### Back (Stern)

- Label showing the stern.
- Illustration of the stern with the rudder and propeller.

#### Sides

- Labels for port (left) and starboard (right).

#### Inside the Boat

- Seats
- Steering wheel (helm)
- Engine location

#### On the Deck

- Safety rails
- Access points to the cabin

#### Underwater Components

- Hull
- Propeller
- Rudder

#### How to Use a Boat Diagram for Kids Effectively



Teaching children about boat parts using a diagram can be made more engaging with these tips:

- Interactive Labeling: Provide a blank diagram and ask kids to label the parts.
- Storytelling: Create stories about a boat journey and explain parts as the story progresses.
- Hands-On Activities: Use model boats or craft materials to build parts and relate them to the diagram.
- Videos and Animations: Show animated diagrams that can clearly demonstrate how parts work together.

### Fun Facts About Boats for Kids

- The largest boat in the world is a cruise ship called Symphony of the Seas.
- The first boats were made over 7,000 years ago from logs or reeds.
- Some boats are designed to be very fast, like speedboats, which can go over 200 miles per hour!
- Submarines are special boats that can go underwater and have parts similar to surface boats.

### Conclusion: Exploring the Parts of a Boat Diagram for Kids

Learning about the parts of a boat diagram for kids opens a window into the exciting world of marine transportation. By understanding components like the hull, deck, rudder, and engine, children gain insights into how boats are built and operate. Using colorful diagrams, interactive activities, and stories makes this learning process enjoyable and memorable. Whether for school projects, summer activities, or just sparking curiosity about the sea, familiarizing kids with boat parts is a valuable first step toward exploring the vast, watery world around us.

Start exploring boat diagrams today and see how each part works together to keep a boat safe, stable, and ready for adventure on the water!

**QuestionAnswer** What is the hull of a boat? The hull is the main body of the boat that floats on the water and supports the entire structure. Where is the bow on a boat? The bow is the front part of the boat. What is the stern of a boat? The stern is the back part of the boat. What does the mast do on a boat? The mast is a tall pole that holds the sails, helping the boat to move using the wind. What is the deck of a boat? The deck is the flat surface on top of the boat where people can stand and walk. What is a sail on a boat? A sail is a large piece of fabric that catches the wind to help move the boat forward. Where is the rudder located and what does it do? The rudder is located at the back of the boat and helps steer or turn the boat. What are the windows or portholes on a boat? Portholes are small round windows that let light and air into the boat. Why is the keel important on a boat? The keel is a part at the bottom of the boat that helps keep it balanced and stable in the water.

**Related keywords:** boat parts, boat diagram, kids, marine, vessel, sailboat, engine, rudder, hull, deck

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