Create a Photo-Sharing App with Feed and Uploading (like Instagram)

□ Table of Contents

- Testing, Monitoring, and Maintainability
  - Testing Strategy
    - Comprehensive Testing Framework
  - Monitoring and Analytics
    - Real-time Metrics Dashboard
- Trade-offs, Deep Dives, and Extensions
  - Storage Strategy Trade-offs
  - Feed Algorithm Trade-offs
    - Chronological vs Algorithmic
  - Advanced Features
    - AI-Powered Content Enhancement
  - Future Extensions
    - Next-Generation Features

Table of Contents

Clarify the Problem and Requirements

☐ Back to Top

Problem Understanding

☐ Back to Top

Design a photo-sharing platform that enables users to upload, edit, share, and discover visual content through feeds, stories, and social interactions, similar to Instagram, Pinterest, or Snapchat. The system must handle millions of photos daily with real-time interactions and global content delivery.

Functional Requirements

Back to Top

- **Photo Upload & Processing**: Multi-format support, automatic optimization, filters
- **Social Feed**: Algorithmic timeline, stories, explore page, hashtag discovery
- **Content Interaction**: Likes, comments, shares, saves, direct messaging
- **User Profiles**: Follower/following system, profile customization, bio, highlights
- **Content Creation**: Photo editing, filters, captions, tagging, location
- **Discovery Features**: Search by hashtags, users, locations, trending content
- **Stories & Ephemeral Content**: 24-hour stories, highlights, live streaming
- **Cross-platform**: Web, iOS, Android with seamless sync

Non-Functional Requirements

Back to Top

- **Performance**: <2s image upload, <500ms feed load, instant interactions
- **Scalability**: 1B+ users, 100M+ photos/day, 500M+ interactions/day
- **Availability**: 99.95% uptime with regional failover
- **Storage**: Petabyte-scale image storage, global CDN distribution
- **Quality**: Multiple resolutions, progressive loading, adaptive delivery
- **Security**: Content moderation, privacy controls, secure uploads

Key Assumptions

Back to Top

- Average photo size: 2-8MB original, optimized to 200KB-2MB
- User activity: 20 photos viewed/minute, 5 interactions/minute
- Upload frequency: 95M photos/day globally
- Storage growth: 50TB/day of new content
- Peak traffic: 3x normal load during events
- Content lifecycle: 80% of interactions in first 24 hours

High-Level Architecture

Back to Top

Global System Architecture

Back to Top

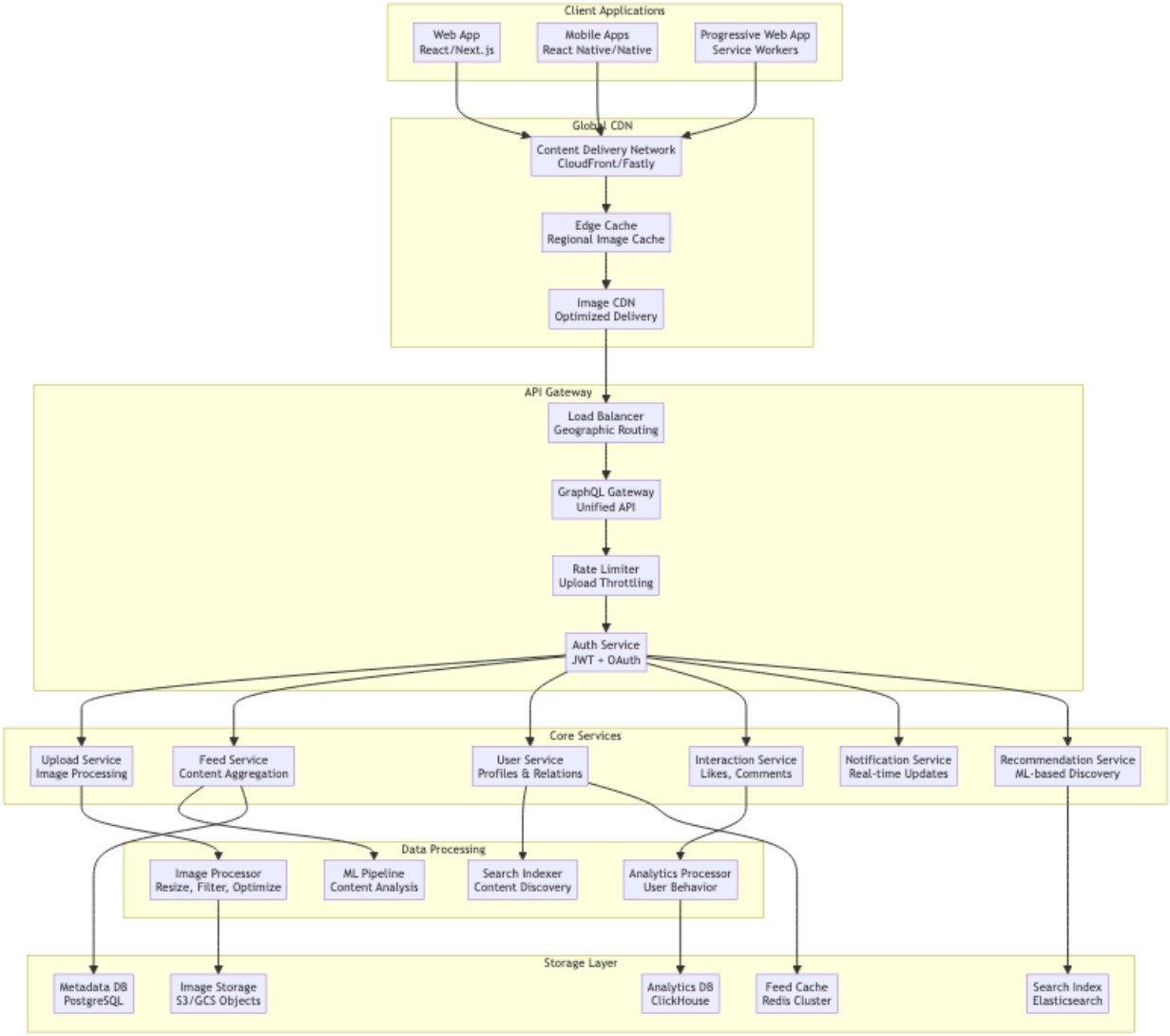
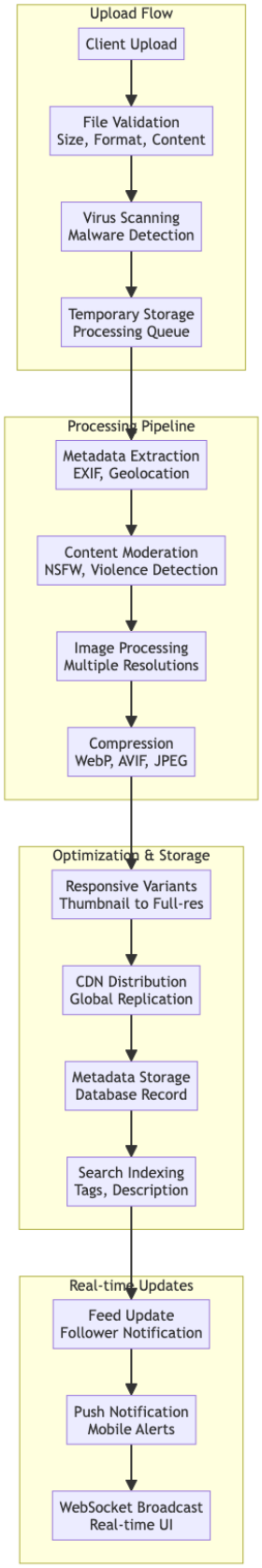


Image Upload & Processing Pipeline

Back to Top

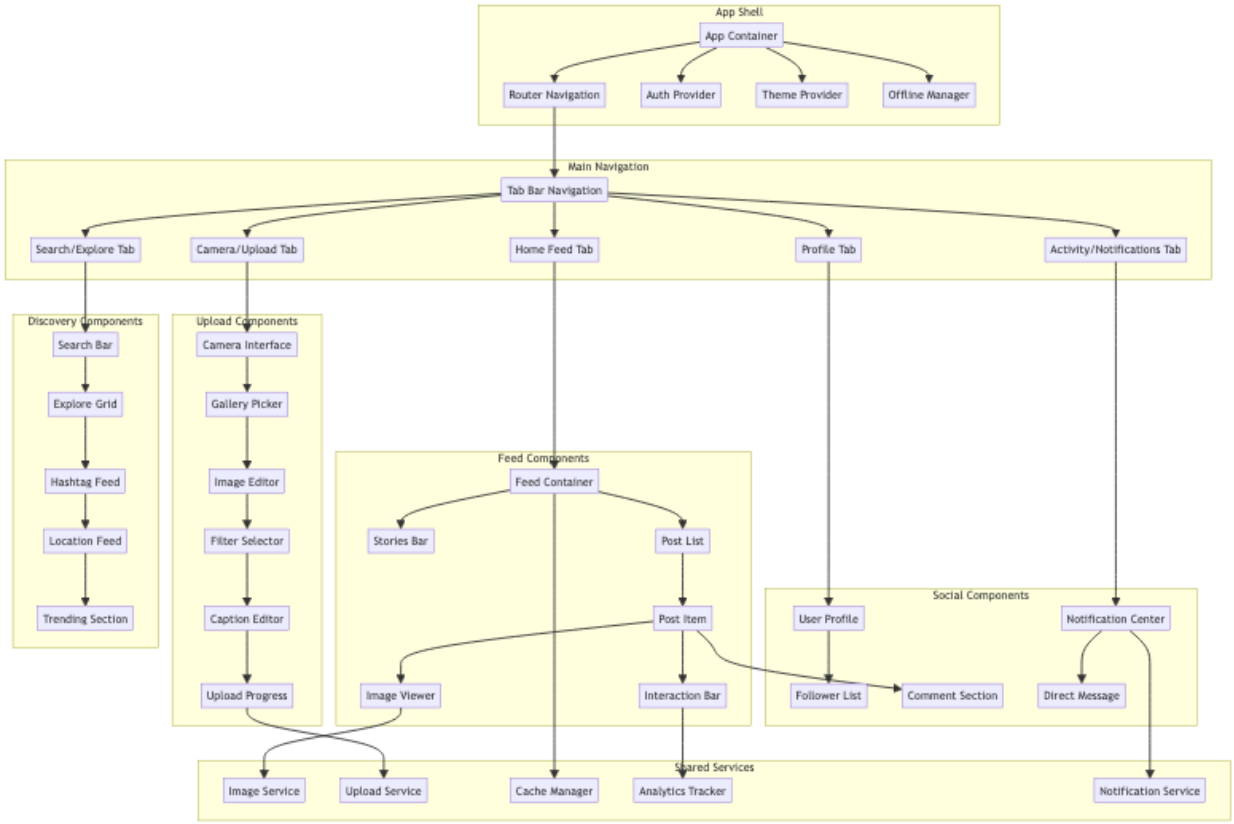

Upload Flow
Client Upload
File Validation
Size, Format, Content
Virus Scanning
Malware Detection
Temporary Storage
Processing Queue
Processing Pipeline
Metadata Extraction
EXIF, Geolocation
Content Moderation
NSFW, Violence Detection
Image Processing
Multiple Resolutions
Compression
WebP, AVIF, JPEG
Optimization & Storage
Responsive Variants
Thumbnail to Full-res
CDN Distribution
Global Replication
Metadata Storage
Database Record
Search Indexing
Tags, Description
Real-time Updates
Feed Update
Follower Notification
Push Notification
Mobile Alerts
WebSocket Broadcast
Real-time UI

UI/UX and Component Structure

Back to Top

Frontend Component Architecture

Back to Top



React Component Implementation Back to Top

PhotoFeedContainer.jsx

```
import React, { useState, useEffect, useCallback, useRef } from 'react';
import { PhotoProvider } from './PhotoContext';
import StoryBar from './StoryBar';
import PostList from './PostList';
```

```
import CameraInterface from './CameraInterface';
import ImageEditor from './ImageEditor';
import { useInfiniteQuery } from 'react-query';

const PhotoFeedContainer = () => {
  const [posts, setPosts] = useState([]);
  const [stories, setStories] = useState([]);
  const [activeTab, setActiveTab] = useState('home');
  const [uploadModalOpen, setUploadModalOpen] = useState(false);
  const [selectedImage, setSelectedImage] = useState(null);

  const {
    data,
    fetchNextPage,
    hasNextPage,
    isFetchingNextPage,
    isLoading
  } = useInfiniteQuery(
    'photoFeed',
    ({ pageParam = null }) => fetchFeedPage(pageParam),
    {
      getNextPageParam: (lastPage) => lastPage.nextCursor,
      staleTime: 5 * 60 * 1000,
    }
  );

  useEffect(() => {
    if (data) {
      const allPosts = data.pages.flatMap(page => page.posts);
      setPosts(allPosts);
    }
  }, [data]);

  useEffect(() => {
    fetchStories();
  }, []);

  const fetchStories = async () => {
    try {
      const response = await fetch('/api/stories');
      const storiesData = await response.json();
      setStories(storiesData.stories);
    } catch (error) {
      console.error('Failed to fetch stories:', error);
    }
```

```
};

const handleImageUpload = useCallback((imageFile) => {
  setSelectedImage(imageFile);
  setUploadModalOpen(true);
}, []);

const handlePostCreate = useCallback(async (postData) => {
  try {
    const response = await fetch('/api/posts', {
      method: 'POST',
      headers: {
        'Content-Type': 'application/json'
      },
      body: JSON.stringify(postData)
    });

    const newPost = await response.json();
    setPosts(prev => [newPost, ...prev]);
    setUploadModalOpen(false);
    setSelectedImage(null);
  } catch (error) {
    console.error('Failed to create post:', error);
  }
}, []);

const updatePost = useCallback((postId, updates) => {
  setPosts(prev => prev.map(post =>
    post.id === postId ? { ...post, ...updates } : post
  ));
}, []);

const fetchFeedPage = async (cursor) => {
  const response = await fetch(`/api/feed?cursor=${cursor || ''}&limit=10`);
  return response.json();
};

return (
  <PhotoProvider value={{
    posts,
    stories,
    updatePost,
    onImageUpload: handleImageUpload
  }}>
    <div className="photo-feed-container">
```

```
{/* Tab Navigation */}
<nav className="tab-navigation">
  <button
    className={activeTab === 'home' ? 'active' : ''}
    onClick={() => setActiveTab('home')}
  >
    Home
  </button>
  <button
    className={activeTab === 'search' ? 'active' : ''}
    onClick={() => setActiveTab('search')}
  >
    Search
  </button>
  <button
    className={activeTab === 'camera' ? 'active' : ''}
    onClick={() => setActiveTab('camera')}
  >
    Camera
  </button>
</nav>

{/* Content Area */}
{activeTab === 'home' && (
  <div className="home-feed">
    <StoryBar stories={stories} />
    <PostList
      posts={posts}
      onLoadMore={fetchNextPage}
      hasNextPage={hasNextPage}
      isLoading={isFetchingNextPage}
    />
  </div>
)}

{activeTab === 'camera' && (
  <CameraInterface onImageCapture={handleImageUpload} />
)}

{/* Upload Modal */}
{uploadModalOpen && selectedImage && (
  <ImageEditor
    image={selectedImage}
    onSave={handlePostCreate}
    onCancel={() => {
```

```
              setUploadModalOpen(false);
              setSelectedImage(null);
            }}
          />
        )}
      </div>
    </PhotoProvider>
  );
};

export default PhotoFeedContainer;
```

PostItem.jsx

```
import React, { useState, useContext, useRef } from 'react';
import { PhotoContext } from './PhotoContext';
import ImageViewer from './ImageViewer';
import InteractionBar from './InteractionBar';
import CommentSection from './CommentSection';

const PostItem = ({ post }) => {
  const { updatePost } = useContext(PhotoContext);
  const [showComments, setShowComments] = useState(false);
  const [isLiked, setIsLiked] = useState(post.isLiked);
  const [likeCount, setLikeCount] = useState(post.likeCount);
  const [imageLoaded, setImageLoaded] = useState(false);
  const imageRef = useRef(null);

  const handleLike = async () => {
    const newLikedState = !isLiked;
    const newLikeCount = likeCount + (newLikedState ? 1 : -1);

    // Optimistic update
    setIsLiked(newLikedState);
    setLikeCount(newLikeCount);

    try {
      await fetch(`/api/posts/${post.id}/like`, {
        method: newLikedState ? 'POST' : 'DELETE'
      });

      updatePost(post.id, {
        isLiked: newLikedState,
        likeCount: newLikeCount
      });
    } catch (error) {
```

```
    // Revert on error
    setIsLiked(!newLikedState);
    setLikeCount(likeCount);
    console.error('Failed to update like:', error);
  }
};

const handleComment = () => {
  setShowComments(!showComments);
};

const handleShare = async () => {
  if (navigator.share) {
    try {
      await navigator.share({
        title: `Photo by ${post.author.username}`,
        text: post.caption,
        url: `/post/${post.id}`
      });
    } catch (error) {
      console.log('Error sharing:', error);
    }
  } else {
    // Fallback to clipboard
    navigator.clipboard.writeText(`${window.location.origin}/post/${post.id}`);
  }
};

return (
  <article className="post-item">
    {/* Post Header */}
    <header className="post-header">
      <div className="author-info">
        <img
          src={post.author.avatarUrl || '/default-avatar.png'}
          alt={post.author.username}
          className="author-avatar"
        />
        <div className="author-details">
          <span className="author-username">{post.author.username}</span>
          {post.location && (
            <span className="post-location">{post.location.name}</span>
          )}
        </div>
      </div>
```

```
  <button className="more-options"> </button>
</header>

{/* Image Content */}
<div className="post-image-container">
  <ImageViewer
    ref={imageRef}
    images={post.media}
    onLoad={() => setImageLoaded(true)}
    onDoubleClick={handleLike}
  />

  {/* Image overlay effects */}
  {!imageLoaded && (
    <div className="image-placeholder">
      <div className="loading-skeleton" />
    </div>
  )}
</div>

{/* Interaction Bar */}
<InteractionBar
  isLiked={isLiked}
  likeCount={likeCount}
  commentCount={post.commentCount}
  onLike={handleLike}
  onComment={handleComment}
  onShare={handleShare}
/>

{/* Caption and Comments */}
<div className="post-content">
  {post.caption && (
    <div className="post-caption">
      <span className="author-username">{post.author.username}</span>
      <span className="caption-text">{post.caption}</span>
    </div>
  )}

  {post.hashtags && post.hashtags.length > 0 && (
    <div className="hashtags">
      {post.hashtags.map(tag => (
        <span key={tag} className="hashtag">#{tag}</span>
      ))}
    </div>
```

```
        )}

        <time className="post-timestamp">
          {formatTimeAgo(post.createdAt)}
        </time>
      </div>

      {/* Comments Section */}
      {showComments && (
        <CommentSection
          postId={post.id}
          comments={post.comments}
          onCommentAdd={(comment) => {
            updatePost(post.id, {
              commentCount: post.commentCount + 1,
              comments: [...(post.comments || []), comment]
            });
          }}
        />
      )}
    </article>
  );
};

// Helper function
const formatTimeAgo = (timestamp) => {
  const now = new Date();
  const postTime = new Date(timestamp);
  const diffInHours = Math.floor((now - postTime) / (1000 * 60 * 60));

  if (diffInHours < 1) return 'Just now';
  if (diffInHours < 24) return `${diffInHours}h ago`;
  return `${Math.floor(diffInHours / 24)}d ago`;
};

export default PostItem;
```

ImageEditor.jsx

```
import React, { useState, useRef, useEffect } from 'react';
import FilterSelector from './FilterSelector';
import CaptionEditor from './CaptionEditor';

const ImageEditor = ({ image, onSave, onCancel }) => {
  const [selectedFilter, setSelectedFilter] = useState(null);
  const [caption, setCaption] = useState('');
```

```
const [hashtags, setHashtags] = useState([]);
const [location, setLocation] = useState(null);
const [isUploading, setIsUploading] = useState(false);
const canvasRef = useRef(null);
const imageRef = useRef(null);

const filters = [
  { id: 'none', name: 'Original', filter: 'none' },
  { id: 'vintage', name: 'Vintage', filter: 'sepia(0.5) saturate(1.4)' },
  { id: 'dramatic', name: 'Dramatic', filter: 'contrast(1.3) brightness(0.9)' },
  { id: 'mono', name: 'Mono', filter: 'grayscale(1)' },
  { id: 'bright', name: 'Bright', filter: 'brightness(1.2) saturate(1.1)' }
];

useEffect(() => {
  if (image && canvasRef.current) {
    drawImageToCanvas();
  }
}, [image, selectedFilter]);

const drawImageToCanvas = () => {
  const canvas = canvasRef.current;
  const ctx = canvas.getContext('2d');
  const img = new Image();

  img.onload = () => {
    canvas.width = img.width;
    canvas.height = img.height;

    // Apply filter if selected
    if (selectedFilter) {
      ctx.filter = selectedFilter.filter;
    }

    ctx.drawImage(img, 0, 0);
  };

  img.src = URL.createObjectURL(image);
};

const handleFilterSelect = (filter) => {
  setSelectedFilter(filter);
};

const extractHashtags = (text) => {
```

```
  const hashtagRegex = /#[\w]+/g;
  const matches = text.match(hashtagRegex) || [];
  return matches.map(tag => tag.slice(1)); // Remove # symbol
};

const handleCaptionChange = (newCaption) => {
  setCaption(newCaption);
  setHashtags(extractHashtags(newCaption));
};

const handleSave = async () => {
  setIsUploading(true);

  try {
    // Convert canvas to blob
    const canvas = canvasRef.current;
    const blob = await new Promise(resolve => {
      canvas.toBlob(resolve, 'image/jpeg', 0.9);
    });

    // Create form data for upload
    const formData = new FormData();
    formData.append('image', blob, 'edited-image.jpg');
    formData.append('caption', caption);
    formData.append('hashtags', JSON.stringify(hashtags));

    if (location) {
      formData.append('location', JSON.stringify(location));
    }

    // Upload image
    const uploadResponse = await fetch('/api/upload', {
      method: 'POST',
      body: formData
    });

    const uploadResult = await uploadResponse.json();

    // Create post
    const postData = {
      mediaUrl: uploadResult.url,
      caption,
      hashtags,
      location,
      filter: selectedFilter?.id
```

```
    };

    onSave(postData);
  } catch (error) {
    console.error('Failed to save post:', error);
  } finally {
    setIsUploading(false);
  }
};

return (
  <div className="image-editor-modal">
    <div className="editor-container">
      <header className="editor-header">
        <button onClick={onCancel} className="cancel-btn">Cancel</button>
        <h2>New Post</h2>
        <button
          onClick={handleSave}
          className="save-btn"
          disabled={isUploading}
        >
          {isUploading ? 'Sharing...' : 'Share'}
        </button>
      </header>

      <div className="editor-content">
        {/* Image Preview */}
        <div className="image-preview">
          <canvas
            ref={canvasRef}
            className="edited-image"
            style={{
              filter: selectedFilter?.filter || 'none',
              maxWidth: '100%',
              height: 'auto'
            }}
          />
        </div>

        {/* Filter Selection */}
        <FilterSelector
          filters={filters}
          selectedFilter={selectedFilter}
          onFilterSelect={handleFilterSelect}
          previewImage={image}
```

```
          />

          {/* Caption Editor */}
          <CaptionEditor
            caption={caption}
            onCaptionChange={handleCaptionChange}
            hashtags={hashtags}
            location={location}
            onLocationChange={setLocation}
          />
        </div>
      </div>
    </div>
  );
};

export default ImageEditor;
```

ImageViewer.jsx

```
import React, { useState, useRef, useCallback } from 'react';

const ImageViewer = React.forwardRef(({
  images,
  onLoad,
  onDoubleClick,
  className = ''
}, ref) => {
  const [currentIndex, setCurrentIndex] = useState(0);
  const [isLoaded, setIsLoaded] = useState(false);
  const [imageError, setImageError] = useState(false);
  const imageRef = useRef(null);

  const currentImage = images[currentIndex];

  const handleImageLoad = useCallback(() => {
    setIsLoaded(true);
    setImageError(false);
    onLoad?.();
  }, [onLoad]);

  const handleImageError = useCallback(() => {
    setImageError(true);
    setIsLoaded(false);
  }, []);
```

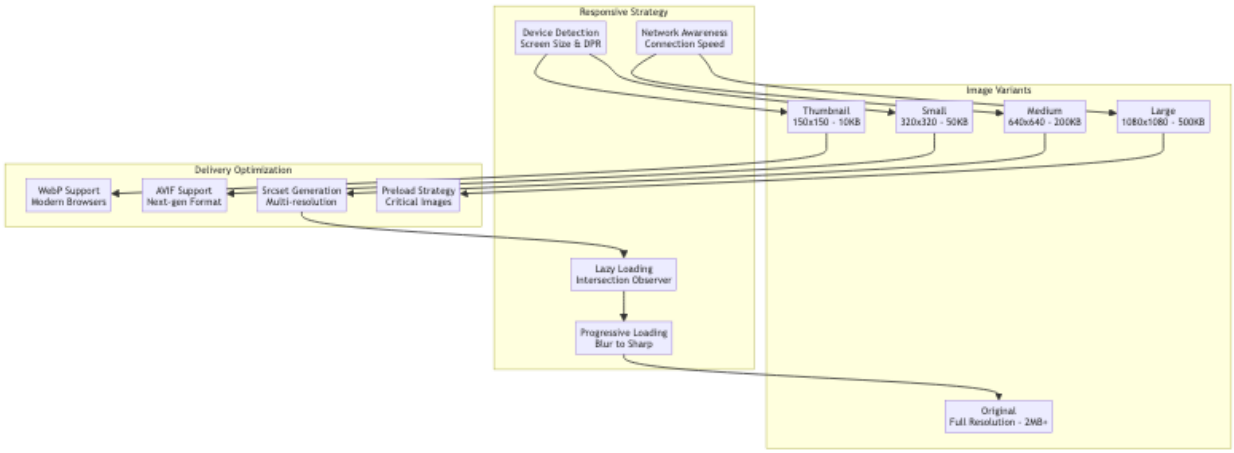
```
const handlePrevious = () => {
  if (currentIndex > 0) {
    setCurrentIndex(currentIndex - 1);
    setIsLoaded(false);
  }
};

const handleNext = () => {
  if (currentIndex < images.length - 1) {
    setCurrentIndex(currentIndex + 1);
    setIsLoaded(false);
  }
};

const getImageSrc = (image) => {
  // Progressive image loading - use appropriate size based on viewport
  const screenWidth = window.innerWidth;
  const devicePixelRatio = window.devicePixelRatio || 1;

  if (screenWidth * devicePixelRatio <= 640) {
    return image.urls.small || image.urls.medium;
  } else if (screenWidth * devicePixelRatio <= 1080) {
    return image.urls.medium || image.urls.large;
  } else {
    return image.urls.large || image.urls.original;
  }
};

return (
  <div className={`image-viewer ${className}`} ref={ref}>
    {/* Main Image */}
    <div className="image-container">
      {!isLoaded && !imageError && (
        <div className="image-loading">
          <div className="loading-spinner" />
        </div>
      )}

      {imageError ? (
        <div className="image-error">
          <span>Failed to load image</span>
        </div>
      ) : (
        <img
          ref={imageRef}
```

```
      src={getImageSrc(currentImage)}
      alt={currentImage.altText || 'Post image'}
      onLoad={handleImageLoad}
      onError={handleImageError}
      onDoubleClick={onDoubleClick}
      className={`main-image ${isLoaded ? 'loaded' : ''}`}
      loading="lazy"
    />
  )}

  {/* Multiple Image Navigation */}
  {images.length > 1 && (
    <>
      <button
        className="nav-btn prev-btn"
        onClick={handlePrevious}
        disabled={currentIndex === 0}
        aria-label="Previous image"
      >
        ‹
      </button>

      <button
        className="nav-btn next-btn"
        onClick={handleNext}
        disabled={currentIndex === images.length - 1}
        aria-label="Next image"
      >
        ›
      </button>

      {/* Image Indicators */}
      <div className="image-indicators">
        {images.map((_, index) => (
          <button
            key={index}
            className={`indicator ${index === currentIndex ? 'active' : ''}`}
            onClick={() => {
              setCurrentIndex(index);
              setIsLoaded(false);
            }}
            aria-label={`View image ${index + 1}`}
          />
        ))}
      </div>
```

```
          </>
        )}
      </div>
    </div>
  );
});

export default ImageViewer;
```

Responsive Image Rendering

☐ Back to Top



Real-Time Sync, Data Modeling & APIs

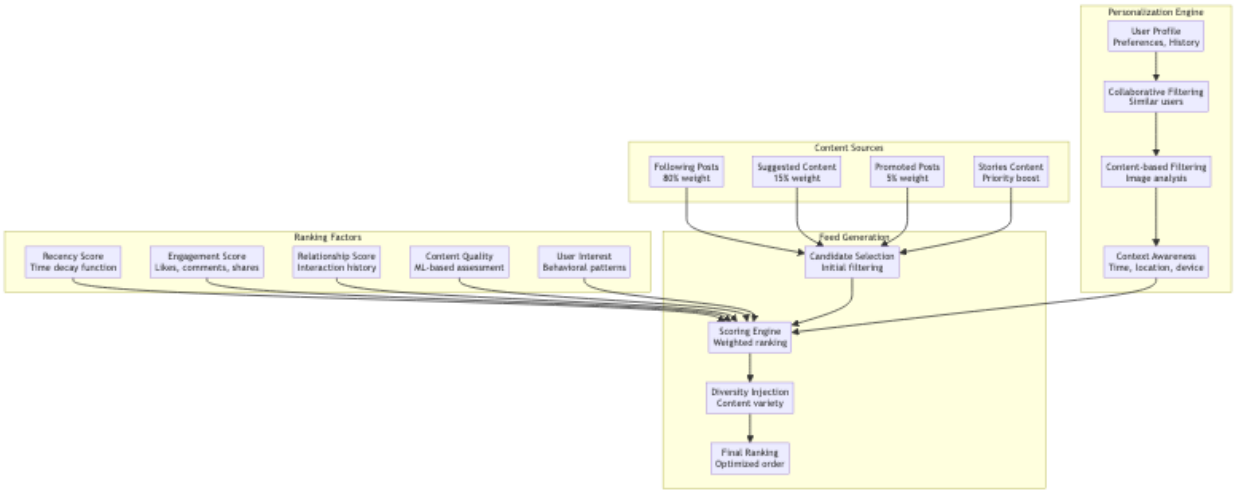
☐ Back to Top

Feed Algorithm Implementation

☐ Back to Top

Chronological vs Algorithmic Feed

☐ Back to Top



Real-time Feed Updates Back to Top

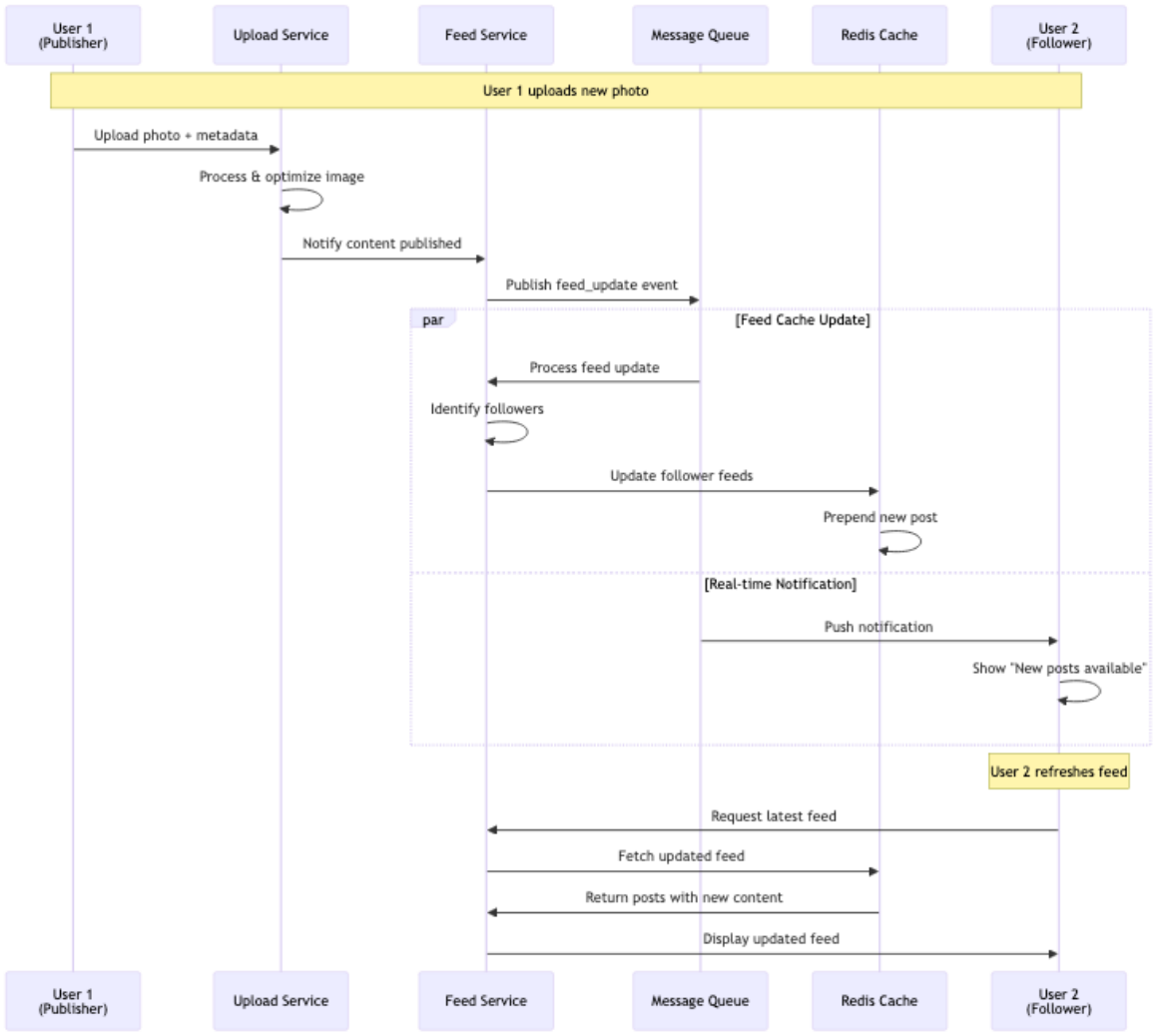
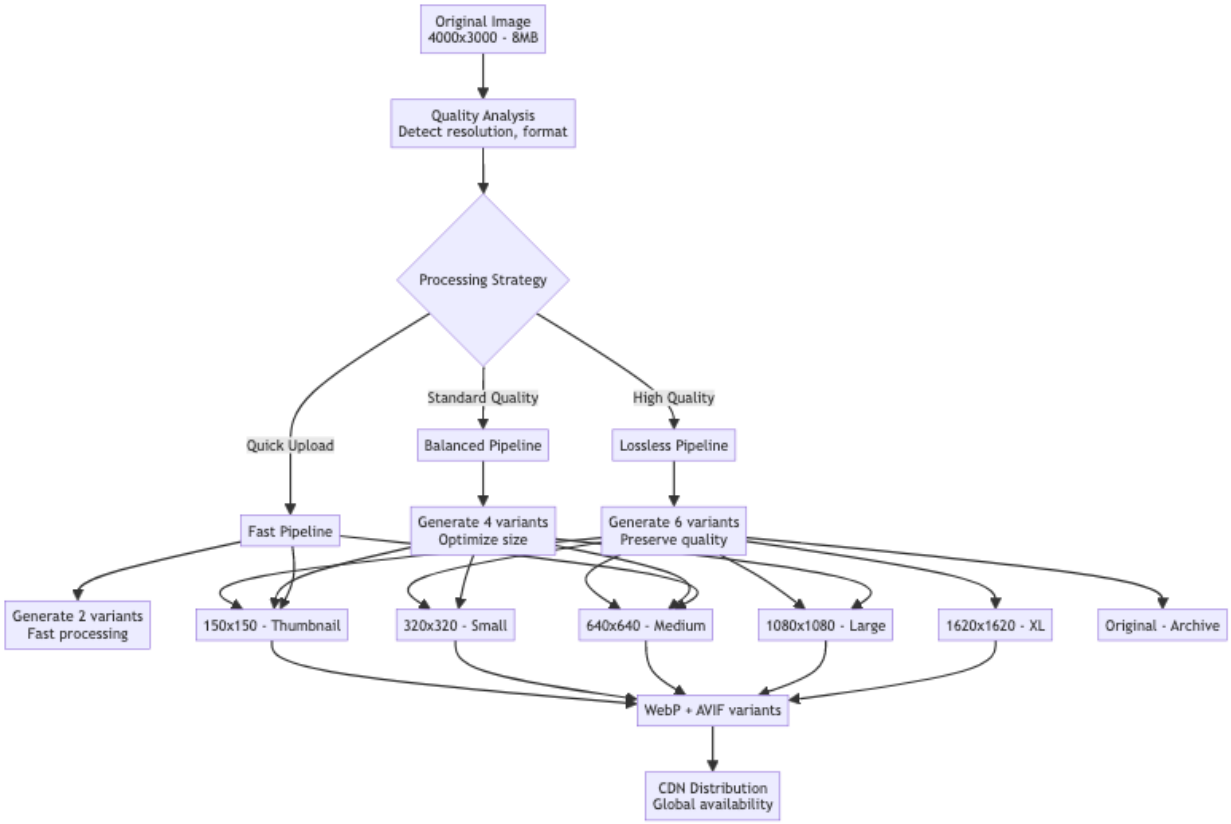


Image Processing Algorithm

Back to Top

Multi-Resolution Generation

Back to Top



Data Models

Back to Top

Post Schema

Back to Top

```
Post {
  id: UUID
  user_id: UUID
  caption: String
```

```
  location?: {
    name: String
    coordinates: GeoPoint
  }
  media: [{
    id: UUID
    type: 'image' | 'video'
    urls: {
      thumbnail: String
      small: String
      medium: String
      large: String
      original: String
    }
    alt_text?: String
    filters_applied: [String]
  }]
  hashtags: [String]
  mentions: [UserID]
  metadata: {
    created_at: DateTime
    updated_at: DateTime
    is_archived: Boolean
    privacy: 'public' | 'followers' | 'private'
    comments_enabled: Boolean
    likes_enabled: Boolean
  }
  engagement: {
    likes_count: Integer
    comments_count: Integer
    shares_count: Integer
    saves_count: Integer
    views_count: Integer
  }
  algorithm_scores: {
    quality_score: Float
    engagement_rate: Float
    virality_potential: Float
    spam_probability: Float
  }
}
```

User Profile Schema □ Back to Top

```
UserProfile {
  id: UUID
  username: String
  display_name: String
  bio?: String
  avatar_url?: String
  website?: String
  verified: Boolean
  private: Boolean
  statistics: {
    posts_count: Integer
    followers_count: Integer
    following_count: Integer
    stories_highlights: Integer
  }
  preferences: {
    theme: 'light' | 'dark' | 'auto'
    language: String
    timezone: String
    notifications: {
      likes: Boolean
      comments: Boolean
      follows: Boolean
      mentions: Boolean
      stories: Boolean
    }
    privacy: {
      profile_visibility: 'public' | 'followers' | 'private'
      story_visibility: 'public' | 'followers' | 'close_friends'
      activity_status: Boolean
      read_receipts: Boolean
    }
  }
}
```

TypeScript Interfaces & Component Props

Back to Top

Core Data Interfaces

```typescript
interface Post {
  id: string;
```

```
  userId: string;
  caption: string;
  media: MediaItem[];
  location?: Location;
  hashtags: string[];
  mentions: string[];
  likes: number;
  comments: number;
  createdAt: Date;
  isPrivate: boolean;
}

interface MediaItem {
  id: string;
  type: 'image' | 'video';
  url: string;
  thumbnailUrl: string;
  width: number;
  height: number;
  altText?: string;
  filters?: string[];
}

interface User {
  id: string;
  username: string;
  displayName: string;
  bio?: string;
  avatarUrl?: string;
  isVerified: boolean;
  isPrivate: boolean;
  followerCount: number;
  followingCount: number;
  postCount: number;
}

interface Story {
  id: string;
  userId: string;
  media: MediaItem;
  text?: string;
  createdAt: Date;
  expiresAt: Date;
  views: number;
}
```

Component Props Interfaces

```typescript
interface PhotoFeedProps {
  posts: Post[];
  onPostLike: (postId: string) => void;
  onPostComment: (postId: string, comment: string) => void;
  onLoadMore: () => void;
  isLoading?: boolean;
  hasMore?: boolean;
}

interface ImageUploadProps {
  onUpload: (files: File[]) => void;
  onFiltersApply: (filters: FilterConfig) => void;
  maxFiles?: number;
  acceptedFormats?: string[];
  compressImages?: boolean;
  showPreview?: boolean;
}

interface UserProfileProps {
  user: User;
  posts: Post[];
  isOwnProfile: boolean;
  onFollow?: () => void;
  onMessage?: () => void;
  onPostSelect: (post: Post) => void;
  displayMode?: 'grid' | 'list';
}

interface StoriesBarProps {
  stories: Story[];
  onStoryView: (storyId: string) => void;
  onAddStory?: () => void;
  autoplay?: boolean;
  showAddButton?: boolean;
}
```

API Reference

☐ Back to Top

Content Management

- `POST /api/posts` - Upload new photo/video post with metadata and filters
- `GET /api/posts/:id` - Fetch specific post with comments and engagement data
- `PUT /api/posts/:id` - Edit post caption, location, or privacy settings
- `DELETE /api/posts/:id` - Delete post and associated media files
- `GET /api/posts/feed` - Get personalized feed with algorithmic ranking

Media Processing

- `POST /api/media/upload` - Upload raw media files with progress tracking
- `POST /api/media/filters` - Apply filters and effects to uploaded media
- `GET /api/media/optimize` - Get optimized media URLs for different screen sizes
- `POST /api/media/compress` - Compress media files for faster loading
- `GET /api/media/:id/metadata` - Get media EXIF data and technical information

Social Interactions

- `POST /api/posts/:id/like` - Like or unlike a post with engagement tracking
- `POST /api/posts/:id/comments` - Add comment to post with mention support
- `GET /api/posts/:id/comments` - Get paginated comments with nested replies
- `POST /api/users/:id/follow` - Follow or unfollow user with notification
- `GET /api/users/:id/followers` - Get user's followers list with pagination

Discovery & Search

- `GET /api/explore` - Get trending and recommended content for discovery
- `GET /api/search/posts` - Search posts by hashtags, location, or content
- `GET /api/search/users` - Search users by username, display name, or bio
- `GET /api/hashtags/trending` - Get trending hashtags with usage statistics
- `GET /api/locations/nearby` - Get nearby locations for photo tagging

Stories & Ephemeral Content

- `POST /api/stories` - Create new story with 24-hour expiration
- `GET /api/stories/feed` - Get stories from followed users in chronological order
- `PUT /api/stories/:id/view` - Mark story as viewed with analytics tracking
- `GET /api/stories/:id/viewers` - Get list of users who viewed the story
- `DELETE /api/stories/:id` - Delete story before expiration

User Profile

- `GET /api/users/:id/profile` - Get user profile with posts and statistics
- `PUT /api/users/profile` - Update user profile information and settings
- `GET /api/users/:id/posts` - Get user's posts with privacy filtering
- `POST /api/users/avatar` - Update user profile picture with cropping
- `GET /api/users/settings` - Get user privacy and notification preferences

Performance and Scalability

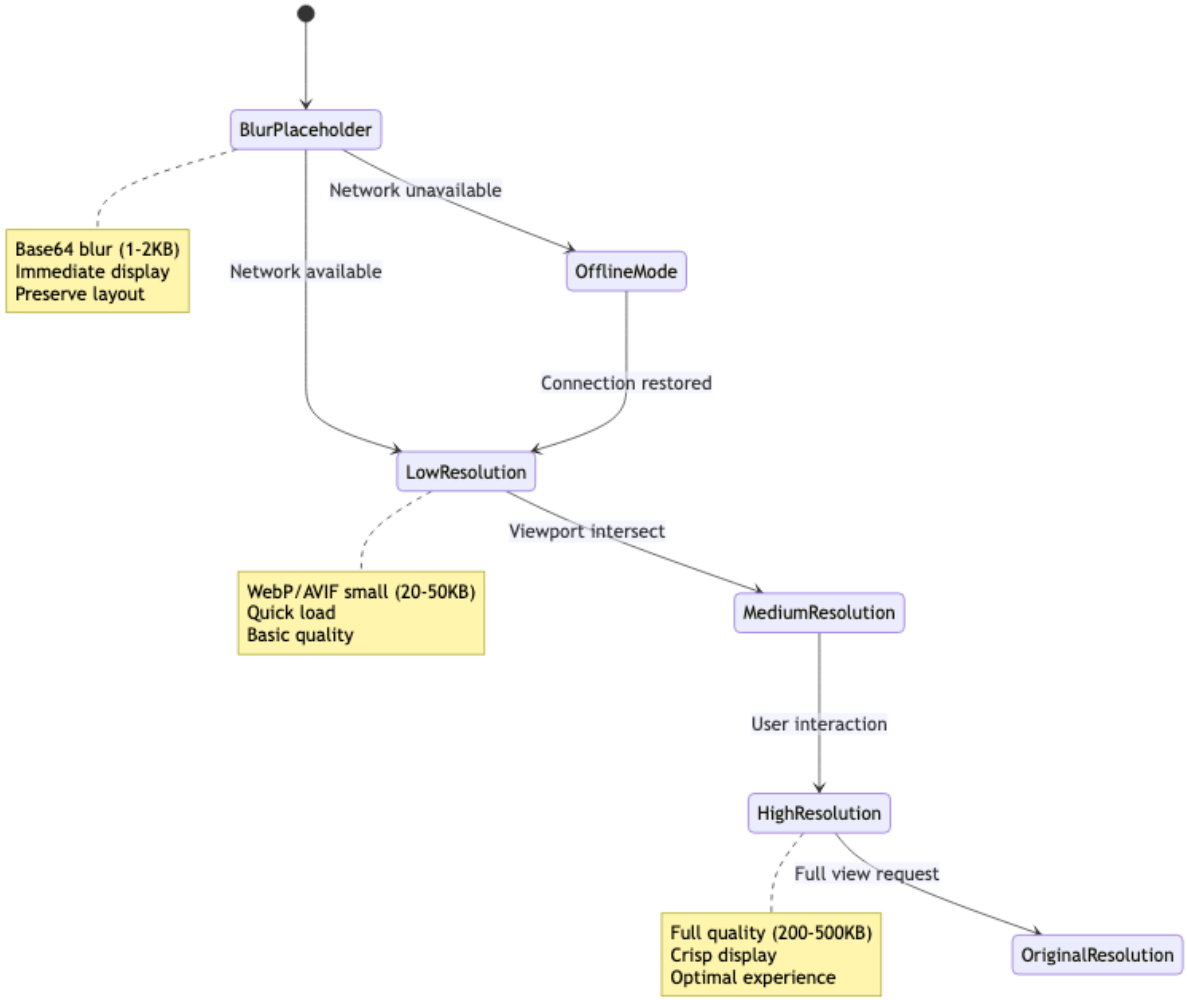
Back to Top

Image Delivery Optimization

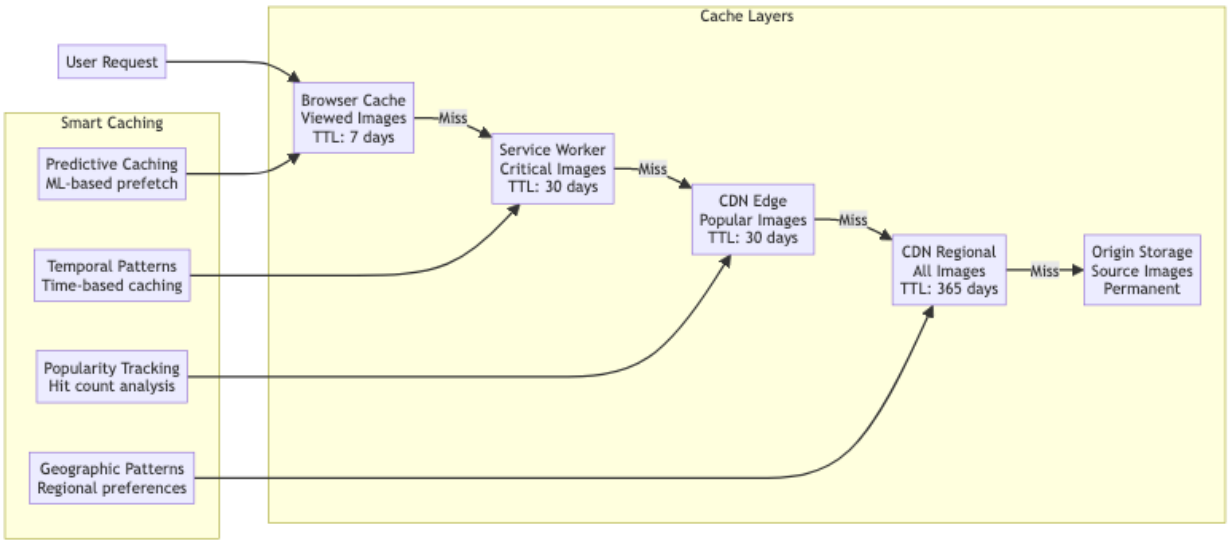
Back to Top

Progressive Image Loading

Back to Top



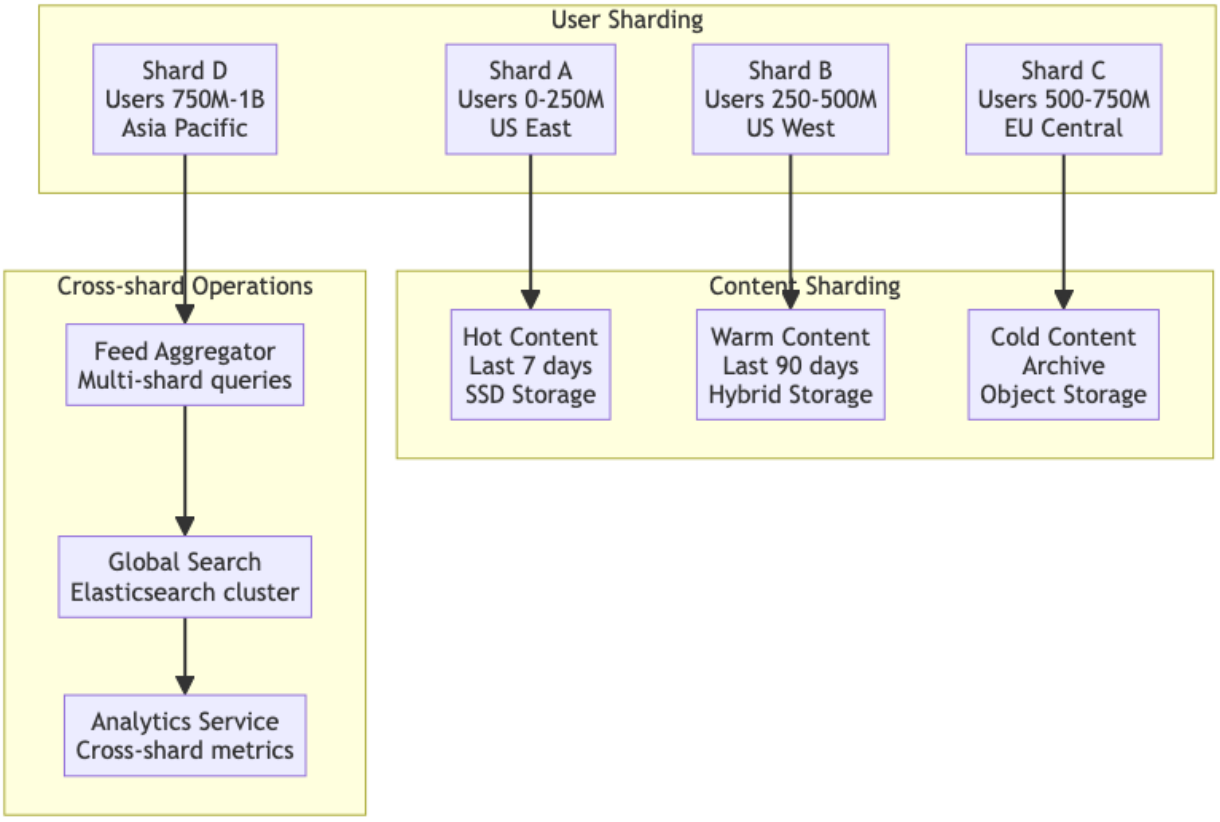
CDN Caching Strategy □ Back to Top



Database Scaling Strategy

□ Back to Top

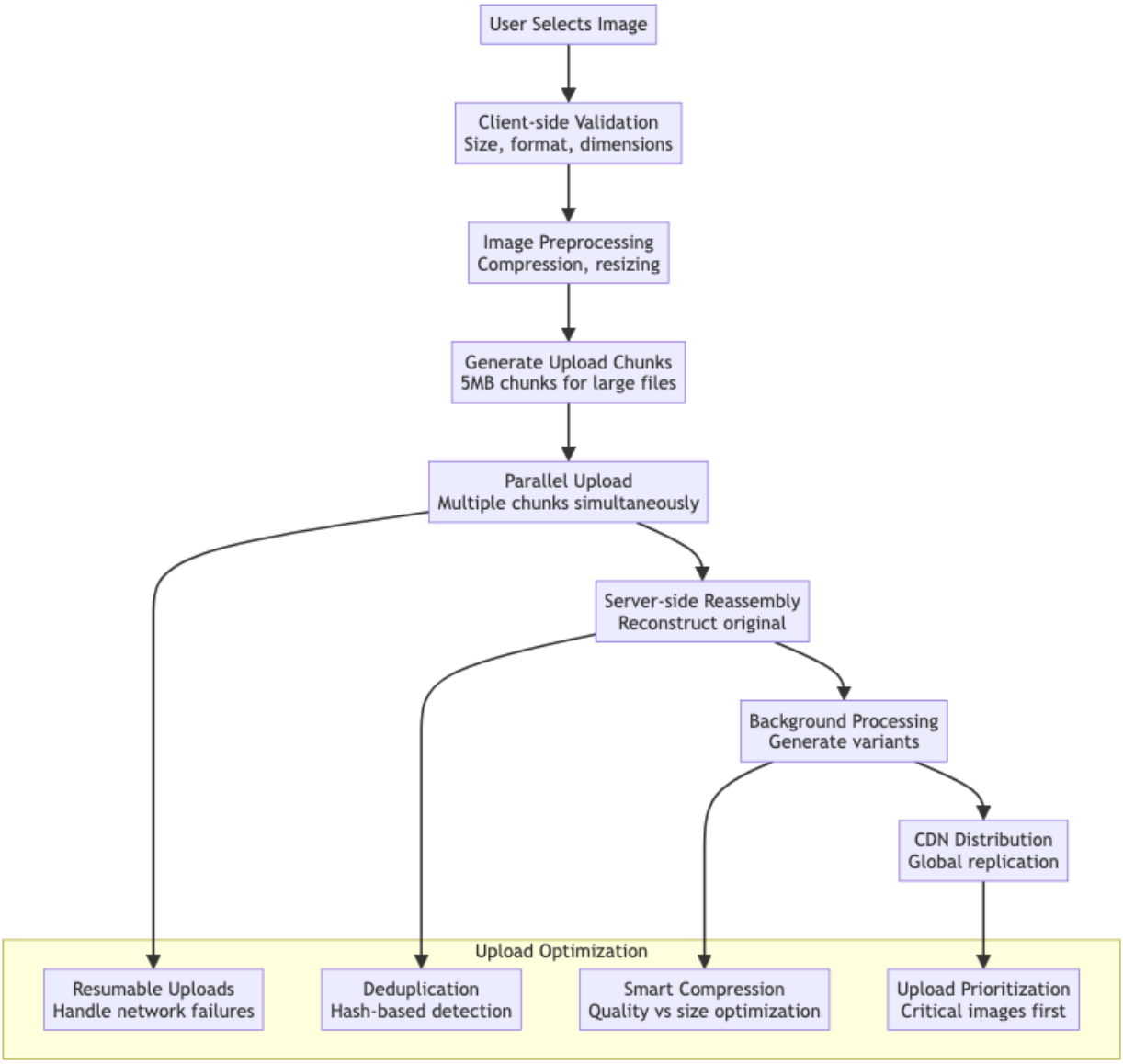
Sharding by User ID □ Back to Top



Upload Performance Optimization

Back to Top

Parallel Upload Strategy Back to Top



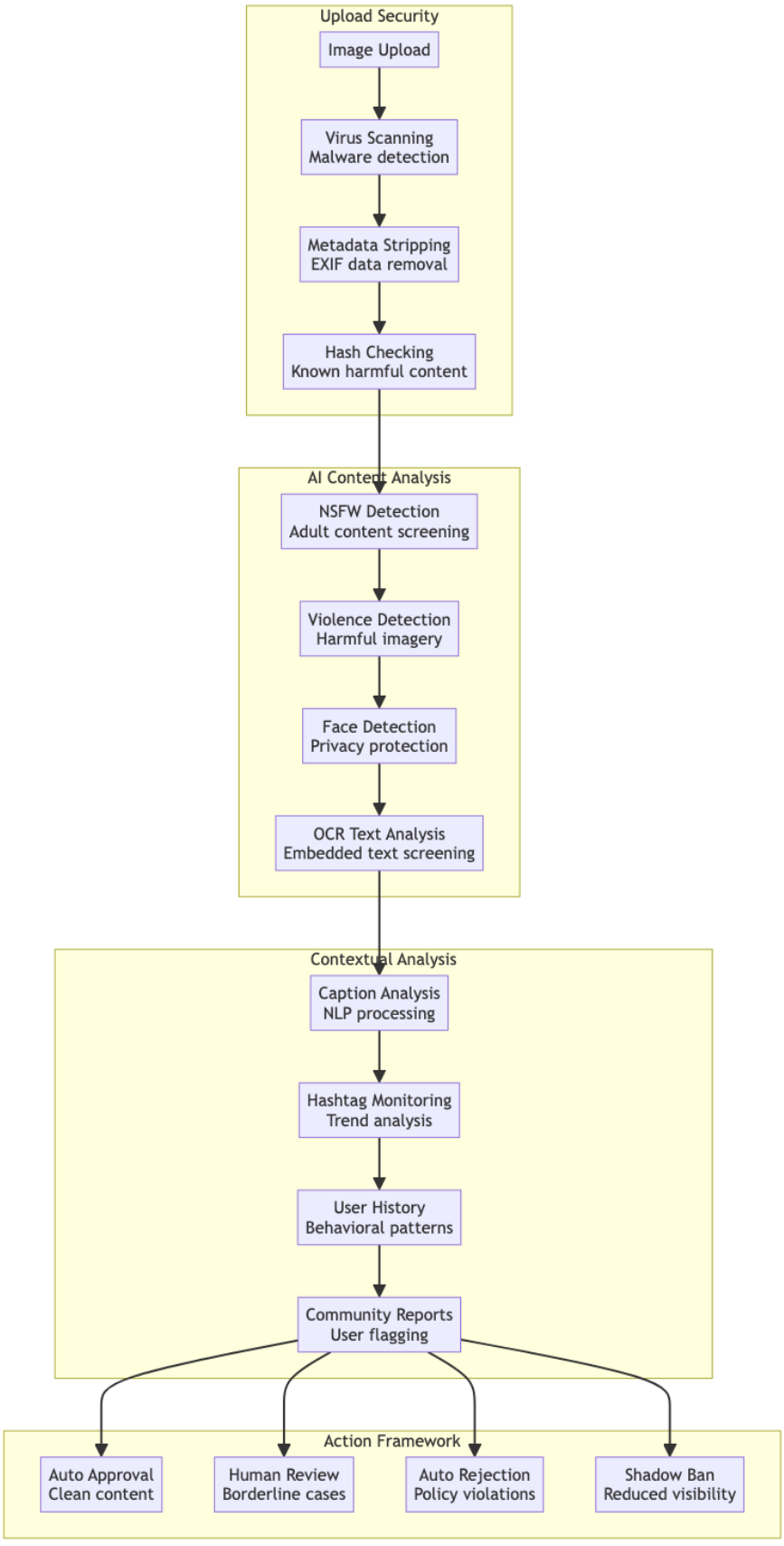
Security and Privacy

Back to Top

Content Moderation Pipeline

Back to Top

Automated Content Screening □ Back to Top

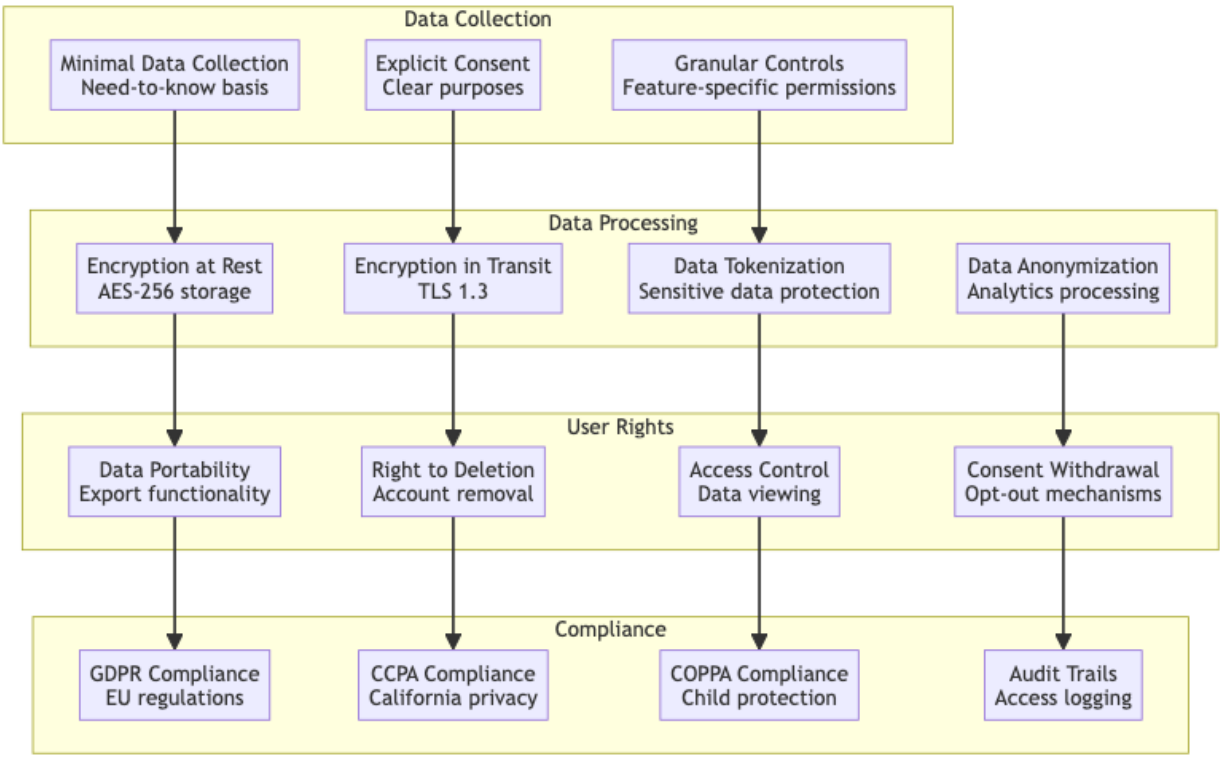

Upload Security
Image Upload
Virus Scanning
Malware detection
Metadata Stripping
EXIF data removal
Hash Checking
Known harmful content
AI Content Analysis
NSFW Detection
Adult content screening
Violence Detection
Harmful imagery
Face Detection
Privacy protection
OCR Text Analysis
Embedded text screening
Contextual Analysis
Caption Analysis
NLP processing
Hashtag Monitoring
Trend analysis
User History
Behavioral patterns
Community Reports
User flagging
Action Framework
Auto Approval
Clean content
Human Review
Borderline cases
Auto Rejection
Policy violations
Shadow Ban
Reduced visibility

Privacy Protection Framework

Back to Top

Data Protection Strategy

Back to Top



Testing, Monitoring, and Maintainability

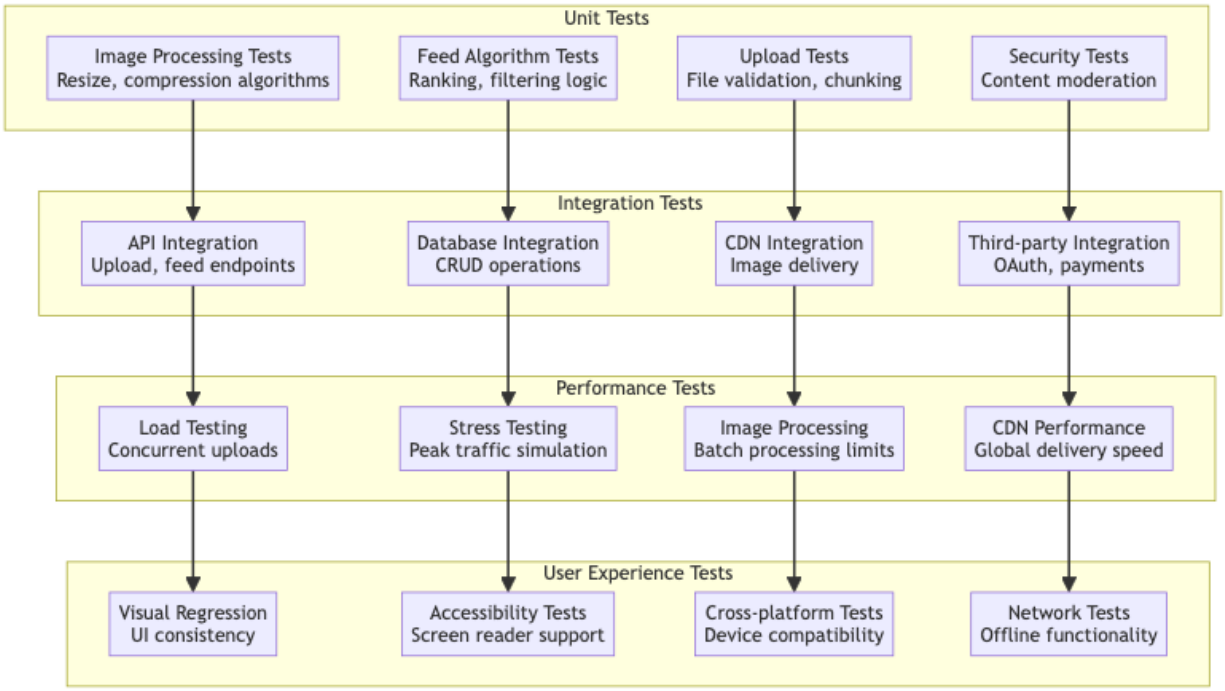
Back to Top

Testing Strategy

Back to Top

Comprehensive Testing Framework

Back to Top



Monitoring and Analytics

☐ Back to Top

Real-time Metrics Dashboard

☐ Back to Top

Trade-offs, Deep Dives, and Extensions

☐ Back to Top

Storage Strategy Trade-offs

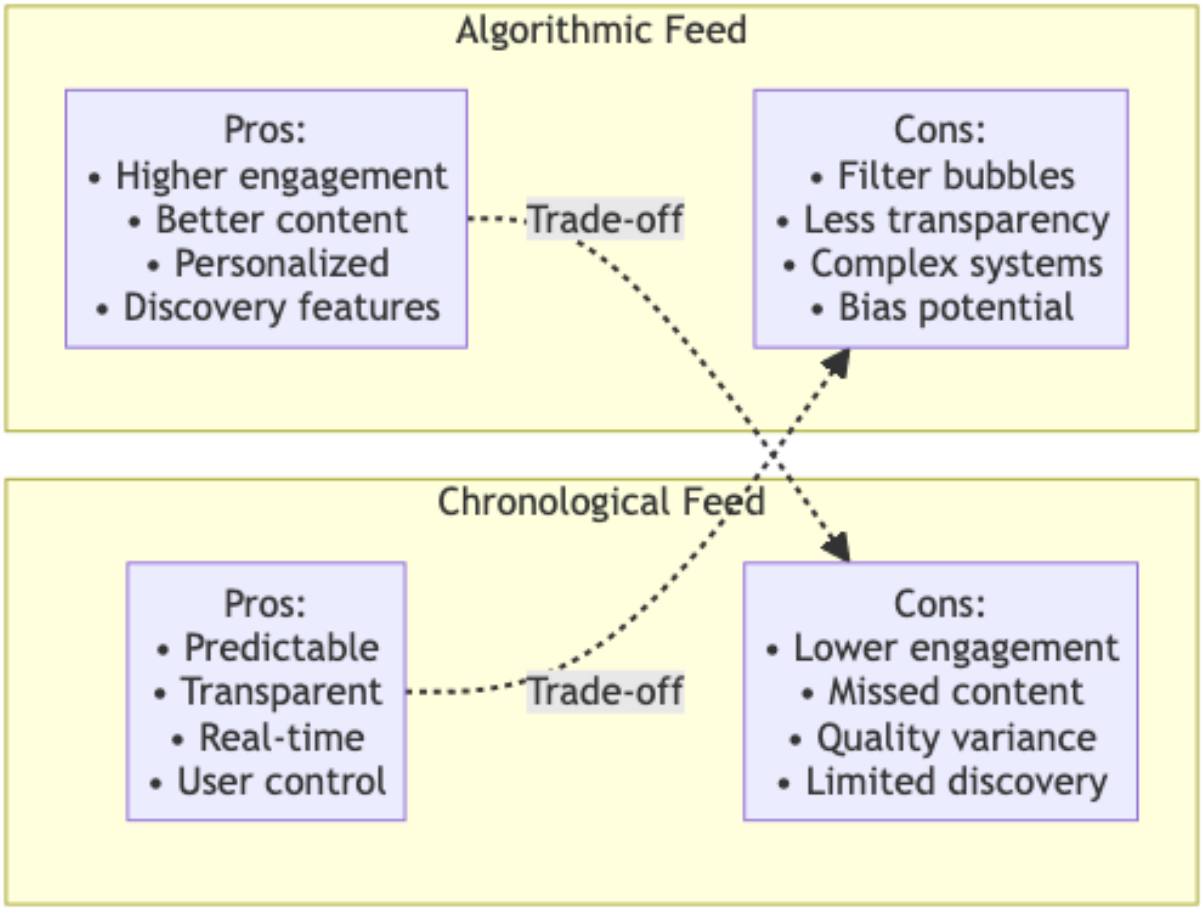
☐ Back to Top

Approach	Object Storage (S3)	CDN-first	Distributed FS	Hybrid
Cost	Medium	High	Low	Medium
Performance	Good	Excellent	Variable	Good
Scalability	Excellent	Excellent	Good	Excellent
Complexity	Low	Medium	High	High
Global Reach	Good	Excellent	Limited	Excellent
Durability	99.999999999%	Dependent	Variable	High

Feed Algorithm Trade-offs

Back to Top

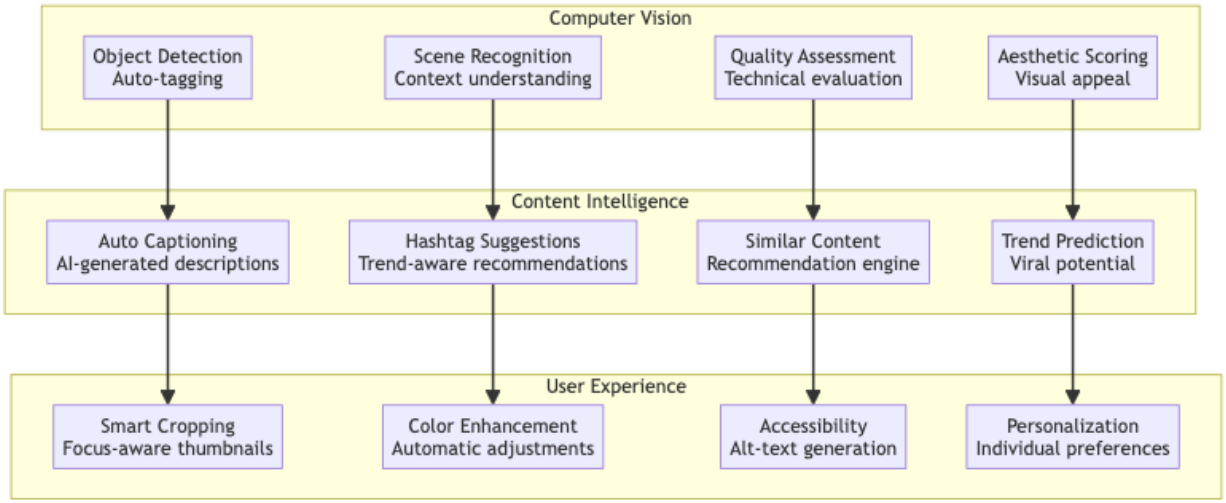
Chronological vs Algorithmic Back to Top



Advanced Features

Back to Top

AI-Powered Content Enhancement Back to Top



Future Extensions

Back to Top

Next-Generation Features Back to Top

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1. **Immersive Content**:
   - AR filters and effects
   - 3D photo viewing
   - Virtual gallery spaces
   - Interactive storytelling
2. **AI-Enhanced Creation**:
   - Style transfer filters
   - Content generation
   - Smart editing suggestions
   - Automated highlight reels
3. **Social Commerce**:
   - Shoppable posts
   - Virtual try-on

- Influencer marketplace
- Live shopping streams

4. **Advanced Analytics**:
    - Emotional engagement tracking
    - Visual trend analysis
    - Creator performance insights
    - Audience behavior mapping

This comprehensive design provides a robust foundation for building a scalable, engaging photo-sharing platform that handles millions of users while delivering high-quality visual experiences with advanced social features.