Министерство науки и высшего образования Российской Федерации

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**Преподаватель:**   
Осипов Святослав Владимирович

**Выполнил:**

Фан Нгок Туан

**Группа:** Р3221

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## **1. Introduction**

* 1. Purpose**:** This document outlines the functional and non-functional requirements, describes use cases, and identifies the actors required to develop the system. This document can be considered as an agreement between the customer and the contractor about the product to be developed.
  2. Document conventions**:**
* **Bing :** Name of the website <https://bing.com/>
* **GDPR (General Data Protection Regulation):** a regulation on data privacy and security
* **Frontend**: the presentation part of an information or software system, its user interface and related components.
* **Backend**: the internal part of the product, which is located on the server and hidden from users
  1. Intended audience**:**
* Microsoft Executives: Focus on sections 1.4 (Scope), executive summary, and overall goals alignment.
* Bing Product Managers: Focus on sections 3 (Functional Requirements), 4 (Non-Functional Requirements), and Use Case Diagrams.
* Bing Engineering Team (Developers): Focus on sections 3 (Functional Requirements), 4 (Non-Functional Requirements), API specifications, and data models.
* Bing Quality Assurance (Testers): Focus on sections 3 (Functional Requirements), 4 (Non-Functional Requirements), and Use Case Diagrams to create test cases.
* Bing UX/UI Designers: Focus on sections 3 (Functional Requirements) relating to the user interface, and mockups.
* Microsoft Legal and Compliance Team: Focus on sections related to GDPR compliance, data security, and privacy requirements.
* Developers: Primarily concerned with detailed functional and non-functional requirements, API specifications, and system architecture. They use the SRS to guide the development process and ensure the software meets the defined specifications.
* Project Managers: Use the SRS for project planning, resource allocation, and tracking progress. They focus on the scope, timelines, and dependencies outlined in the document.
* Testers: Rely on the SRS to develop test cases and verify that the software functions as intended. They focus on functional requirements, performance criteria, and usability aspects.
  1. Scope**:** The scope includes core functionalities such as web content indexing, search query processing, result ranking, and user interface design for desktops, tablets, and mobile devices. It also encompasses additional features like image search, news aggregation, contextual suggestions, and integration with Microsoft’s ecosystem, while ensuring compliance with data privacy regulations (e.g., GDPR) and maintaining high performance and scalability under varying user traffic.
  2. References**:**
* General Data Protection Regulation (GDPR): EU regulation on data privacy and security, effective May 25, 2018.
* Industry standards for web-based search engines and user interface design.
* Bing.com website: <https://www.bing.com/>
* Microsoft internal documentation and guidelines on software development, performance, and security.

## 2. General Description

### 2.1 Product perspective:

Bing offers a comprehensive search experience with features like web search, visual search, AI-powered answers, news integration, maps, and a rewards program. Its value proposition lies in combining traditional search with AI-driven insights, robust privacy controls, and seamless integration with the Microsoft ecosystem, including Windows, Edge and Office. Bing targets general consumers, professionals, students, advertisers, and developers, differentiating itself through AI innovations like Copilot integration, a unique rewards program, and a focus on privacy. Future opportunities include expanding AI capabilities, growing its global presence, and attracting more advertisers, positioning Bing as strong alternative in the evolving search landscape.

### 2.2 Product features:

This product offers web, image, video, voice and news search; AI integration (Copilot) for direct answers; maps and local search; Reward program; seamless integration with the Microsoft ecosystem; multilingual support; strong privacy controls; accessibility features (voice search, screen readers); Bing Ads; Bing Shopping

### 2.3 User class and characteristics:

* + 1. General Users:
* Casual internet users looking for quick answers, browsing, or general-purpose searches
* Key characteristics:
  + Tend to perform simple, everyday searches.
  + Require straightforward, fast results displayed clearly
    1. Academic and Research Users:
* Students, educators, and professionals conducting in-depth research or gathering information
* Key characteristics:
  + Require more curated and detailed results
  + Utilize advanced search operators to refine search results
    1. Business and organizations

### 2.4 Operating environment:

Bing.com can operate on any system that features a modern web browser and a reliable internet connection. Users can access Bing on devices like desktops, laptops, tablets, and smartphones. To ensure an optimal search experience, a stable internet connection is recommended, ideally with a speed of at least 500 Kbps. This allows users to effectively search and access a wide range of content available on the platform

### 2.5 Constraints:

2.5.1 Regulatory and legal constraints:

* Compliance with GDPR, and other data privacy laws limits data collection and storage practices.
* Adherence to accessibility standards (WCAG 2.1) requires additional UI/UX considerations.
* Adherence to copyright laws globally, including preventing the indexing and display of copyrighted content without permission and responding to takedown requests (DMCA).
* Compliance with anti-trust and competition laws, preventing anti-competitive practices.

2.5.3 Resource Constraints:

* Limited bandwidth for handling high traffic during peak usage times.
* Budget constraints for scaling infrastructure to support global users.

### 2.6 Assumptions and dependencies:

* + 1. Assumptions:
* User Behavior:
* Users will primarily interact with Bing through a web browser or mobile app.
* Users have basic familiarity with search engines and their functionalities.
* Technical Infrastructure:
* Microsoft Azure will provide reliable and scalable cloud infrastructure to support Bing’s operations.
* Third-party services (e.g., map data providers, news feeds) will remain available and functional.
* Data Availability:
* Sufficient data will be available for training and improving AI models (e.g., Copilot).
* Web crawlers will have access to publicly available content for indexing.
* Regulatory Compliance:
* Bing will operate in regions with clear legal frameworks for search engines and data privacy.
* Users will consent to data collection and usage as per the privacy policy.
* Performance Expectations:
* Users expect fast response times (<500ms) for search queries.
* Bing will handle peak traffic without significant degradation in performance.
* Integration:
* Bing will seamlessly integrate with other Microsoft products (e.g., Windows, Edge, Office 365).
* APIs provided by Bing will be used by third-party developers without significant issues.
  + 1. Dependences
* Third-Party Services:
* Map Data Providers: Bing Maps relies on external providers for geolocation and navigation data.
* News Aggregators: Bing News depends on partnerships with news outlets and aggregators.
* AI Models: Features like Copilot depend on Microsoft’s AI infrastructure and models.
* Microsoft Ecosystem:
* Integration with Azure for cloud computing, storage, and AI services.
* Synergy with Windows OS and Edge browser for seamless user experiences.
* Regulatory Frameworks:
* Compliance with global and regional laws (e.g., GDPR, CCPA) is mandatory for operation.
* Accessibility standards (e.g., WCAG 2.1) must be adhered to for legal and ethical reasons.
* User Data:
* Bing’s personalization features depend on user data (e.g., search history, preferences).
* Consent mechanisms must be in place to collect and use this data legally.
* Internet Infrastructure:
* Bing’s performance depends on global internet connectivity and speed.
* Users in regions with poor internet infrastructure may experience degraded performance.

## 3. System Requirements

### 3.1 Functional requirements

**3.1.1 User requirements:**

* Search:
  + Bing offers an ability to search for content on the site using keywords, phrases, returning relevent results.
  + Bing supports searches by multiple criteria; enables filter and sort search results according to these criteria.
  + Bing shall display search suggestions dynamically.
* Navigation:
* Bing shall enable navigate the site using a well-structured network of internal and external links
* Bing enables utilize a sitemap for access to all pages and site sections
* Bing employs breadcrumbs to indicate the user’s current location within the site hierarchy.
* View content:
  + Bing shall present content with optimal readability and visual appeal, utilizing appropriate fonts, text sizes, colors, layouts, and high-quality media.
  + Bing supports multimedia (audio, video, etc.).
  + Bing possesses the ability to zoom in/out of content.
* Interaction:
  + Bing provides the ability to interact with the website through various engagement features.
  + Bing utilizes a product/article review and comment system for user feedback and discussion
  + Bing supports share content on social networks.
  + Bing shall enable contact support through a dedicated contact form.
  + Bing helps engage in live chat with support staff for immediate assistance.
  + Bing supports participance in online forums.
* User accounts (if required):
  + Bing possesses ability to create accounts, log in, and manage personal information.
  + Bing supports register for an account using email, phone number, or social network account.
  + Bing ensures login and logout procedures.
  + Bing provides ability to manage personal information (profile, address, password, etc.).
  + Bing supports configure notification preferences (email, SMS).
  + Bing shall enable recover forgotten password through security process.
* Payments (if e-commerce site):
  + Bing offers ability to make secure and convenient online payments.
  + Bing supports multiple payment methods (credit cards, e-wallets, bank transfers, etc.).
  + Bing shall protect sensitive payment information.
  + Bing enables confirm successful payments.
  + Bing helps keep track of transaction history.
* Multilingual support (if needed):
  + Bing offers ability to switch between different languages.
  + Bing supports displaying the website interface translated into multiple languages
  + Bing shall present content in the user’s selected language

**3.1.2 Owner requirements:**

* Content Management (CMS):
  + Bing’s CMS enables users to create, edit, delete, and publish content.
  + The CMS supports images and videos management.
  + Bing shall enable users schedule content publishing for future dates and times.
  + The CMS allows for granular user permission management.
  + Bing provides data backup and restore functionality for the CMS.
* Statistics:
  + Bing offers the ability to track and analyze website performance through its static dashboard
  + The statistics dashboard monitors website traffic.
  + The Bing’s dashboard monitors website traffic.
  + The Bing’s dashboard calculates the average time users spend on the site.
  + The Bing’s dashboard tracks the website’s bounce rate.
  + The Bing’s dashboard analyzes search keywords.
  + The dashboard collects and displays user demographics.
* Manage users :
  + Bing provides the ability to manage user account information.
  + Bing enables administrators view and edit user information.
  + Bing shall enable administrators lock or unlock user accounts.
  + Bing offers ability to send email notifications to users.

## 4.External Interface Requirements

### **4.1 User Interfaces ( How system interacts with general users)**

* **Web Access**: Bing shall provide a web interface accessible via Bing.com, supporting interaction across devices (desktop, tablet, mobile)
* **Search API**: Bing shall implement an internal API that accepts user queries and returns results
* **Feature APIs**: Bing shall offer separate endpoints to fetch images, news, and suggestions, integrating with external news APIs where applicable.
* **Data Flow**: Bing shall retrieve real-time data from its internal database and external partners through API calls to populate search results and features.

### **4.2 Communications Interfaces**

* Bing shall use the HTTP protocol for communication over the internet and for the intranet communication will be through TCP/IP protocol suite.

### **4.3 Software Interfaces**

* The Bing.com system shall communicate with the Microsoft Indexing Service to identify and retrieve indexed web content for search queries.
* The Bing.com system shall communicate with the Microsoft News Aggregator to obtain real-time news feeds and integrate them into search results.
* The Bing.com system shall communicate with the Image Database System to access and display image search results based on user queries.
* The Bing.com system shall communicate with the Contextual Advertising Platform to deliver relevant advertisements and suggestions to users, enhancing user experience and revenue generation.
* The Bing.com system shall communicate with the User Profile Management System to provide personalized search results and recommendations based on user preferences and behavior.
* The Bing.com system shall communicate with the Microsoft Analytics System for tracking user interactions, performance metrics, and search trends to improve system functionality and business insights.
* The Bing.com system shall communicate with the Geolocation Service to deliver localized search results and content based on user location.
* The Bing.com system shall communicate with the Security and Privacy System to ensure compliance with data privacy regulations, such as GDPR, and protect user data during transactions and searches.
* The Bing.com system shall communicate with the Third-Party API Gateway to integrate with external content providers (e.g., maps, weather, or social media) for enriched search results.
* The system shall integrate with a third-party Secure Transaction System (e.g., similar to VeriSign) to allow users to complete secure transactions for premium features or services, ensuring trusted and widely-accepted internet security standards for data exchange.

## 5. Non-Functional Requirements

### 5.1 Performance requirements

The performance requirements need to be specified for every functional requirement. The rationale behind it also needs to be elaborated upon.

|  |  |
| --- | --- |
| Search Query Response Time | Functional Requirement: User submits a search query.  Performance Requirement: The average response time for displaying search results should be less than 500 milliseconds.  Rationale: Fast response times are critical for user satisfaction. Delays in displaying results can lead to user frustration and abandonment. |
| Image Loading Time | Functional Requirement: User views an image search results page.  Performance Requirement: Images should load within 2 seconds on a standard broadband connection (10 Mbps).  Rationale: Fast image loading is important for visual appeal and user engagement. Slow-loading images detract from the user experience. |
| Autocomplete Suggestions | Functional Requirement: User types in the search bar and receives autocomplete suggestions.  Performance Requirement: Autocomplete suggestions should appear within 200 milliseconds of each keystroke.  Rationale: Real-time suggestions provide immediate feedback to the user, improving search efficiency and accuracy. |
| Translation Services | Functional Requirement: User requests translation of a web page.  Performance Requirement: The translation should be completed and displayed within 3 seconds.  Rationale: Timely translation allows users to access information in their preferred language without significant delay. |

### 5.2 Safety requirements

* Content Filtering (for SafeSearch): Provide effective content filtering options (SafeSearch) to allow users to filter out explicit or inappropriate content. This is especially important for families and educational institutions.
* Misinformation Mitigation: Implement strategies to combat the spread of misinformation and fake news in search results. This may involve fact-checking, source credibility ratings, and algorithm adjustments.
* Child Safety: Adhere to all applicable child safety regulations and implement measures to protect children from online exploitation.

### 5.3 Security requirements

* Malware Protection: Bing should incorporate robust malware detection and prevention mechanisms to protect users from malicious websites and search results.
* Data Security: Protect user data from unauthorized access, modification, or disclosure. Employ encryption and access controls to safeguard sensitive information.
* Phishing Detection: Implement advanced phishing detection algorithms to identify and flag potentially fraudulent websites.

### 5.4 Software quality attributes

* **Usability**: The system shall provide an intuitive, user-friendly interface that allows users of varying technical backgrounds to easily perform searches, navigate results, and access additional features (e.g., image search, news) across desktops, tablets, and mobile devices. The interface shall adhere to accessibility standards (e.g., WCAG 2.1) to ensure inclusivity for all users.
* **Reliability**: The system shall deliver consistent and accurate search results with a target uptime of 99.9%, minimizing downtime and ensuring availability even under high user traffic or peak usage periods.
* **Performance**: The system shall process search queries and return results within 200 milliseconds under normal conditions, ensuring a fast and efficient user experience, even with large-scale data indexing and retrieval.
* **Maintainability**: The system shall be designed with modular, well-documented code and architecture, allowing the Bing Engineering Team to easily update, troubleshoot, and maintain the software over time with minimal effort.
* **Scalability**: The system shall support scalability to handle increasing user volumes and data growth, ensuring it can adapt to future demand without compromising performance or reliability.
* **Portability**: The system shall function effectively across different platforms and devices (e.g., Windows, macOS, iOS, Android) without requiring significant modifications, ensuring broad accessibility for users.
* **Security**: The system shall protect user data and queries using secure communication protocols (e.g., HTTPS) and comply with data privacy regulations (e.g., GDPR), ensuring user trust and regulatory compliance.
* **Adaptability**: The system shall be flexible enough to incorporate new features, such as advanced AI-driven search capabilities or integration with emerging technologies, to remain competitive in the search engine market.

### 5.5 Other requirements

* **Legal Requirements**: The system shall comply with all applicable laws and regulations, including the General Data Protection Regulation (GDPR), the California Consumer Privacy Act (CCPA), and other regional data privacy and security standards. It shall also adhere to intellectual property laws regarding content indexing and third-party integrations.
* **Resource Utilization**: The system shall optimize the use of computational resources (e.g., CPU, memory, bandwidth) to ensure efficient operation, minimize costs, and maintain environmental sustainability. It shall support cloud-based infrastructure to leverage scalable resources provided by Microsoft Azure or similar platforms.
* **Future Updates**: The system shall be designed to accommodate periodic updates and enhancements, such as improved search algorithms, new feature integrations (e.g., voice search, augmented reality), and compatibility with emerging technologies, to remain competitive and meet evolving user needs.
* **Documentation**: Comprehensive documentation, including user manuals, technical guides, and API specifications, shall be provided to support stakeholders, developers, and users in understanding and utilizing the system effectively.
* **Support and Maintenance**: The system shall include a plan for ongoing support and maintenance, including regular security patches, performance optimizations, and customer support channels to address user issues promptly.

## 6. Requirement Attributes

### 1. Functional Requirements

|  |  |  |  |
| --- | --- | --- | --- |
| **Requirement** | **Priority** | **Effort in Person-Hours** | **Stability** |
| Search | High | 120 | High |
| Navigation | High | 80 | High |
| View content | Medium | 100 | High |
| Interaction | High | 150 | Medium |
| User accounts | Medium | 130 | High |
| Payments | Low | 200 | Low |
| Multilingual support | Medium | 110 | Medium |
| Content Management | High | 180 | Medium |
| Statistics | Medium | 140 | High |
| Manage users | Medium | 120 | High |

### 2. Non-functional Requirements

|  |  |  |  |
| --- | --- | --- | --- |
| **Requirement** | **Priority** | **Effort in Person-Hours** | **Stability** |
| **Search Query** | High | 150 | High |
| **Image Loading** | High | 130 | High |
| **Autocomplete Suggestions** | High | 120 | High |
| **Translation Services** | Medium | 140 | Medium |
| **Content Filtering** | High | 160 | Medium |
| **Misinformation Mitigation** | High | 200 | Medium |
| **Child Safety** | High | 180 | High |
| **Malware Protection** | High | 170 | Medium |
| **Data Security** | High | 190 | High |
| **Phishing Detection** | High | 160 | Medium |
| **Usability** | High | 150 | High |
| **Reliability** | High | 180 | High |
| **Performance** | High | 160 | High |
| **Maintainability** | Medium | 140 | Medium |
| **Scalability** | High | 200 | Medium |
| **Portability** | Medium | 130 | High |
| **Security** | High | 190 | High |

### 3. Risks

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No.** | **Risk Assessment Criteria** | **Type** | **Probability** | **Loss Magnitude** |
| 1 | Delays in implementing fast search query response time (<500 ms) | Technical | Low | Medium |
| 2 | Failure to meet image loading time requirement (<2 seconds) due to network issues | Technical | Medium | Medium |
| 3 | Inaccurate or slow autocomplete suggestions affecting user experience | Business Risk | Low | Medium |
| 4 | Security breaches compromising user data or enabling phishing attacks | Resource | Low | High |
| 5 | Non-compliance with legal requirements (e.g., GDPR, CCPA) due to oversight | Legal | Low | High |
| 6 | Scalability issues under high traffic, impacting reliability (99.9% uptime target) | Technical | Medium | High |
| 7 | Ineffective content filtering or misinformation mitigation leading to user distrust | Business Risk | Medium | Medium |
| 8 | High resource utilization leading to increased operational costs | Resource | Low | Medium |

## 7. APPENDIX A: ANALYS MODELS

### 1. Precedents

### Use Case 1: Register

* **ID:** 1
* **Brief Description:** Registering for a Bing.com account using an email address, phone number, or social network account.
* **Primary Actor:** Unregistered/Unauthorized User
* **Preconditions:** The user has access to Bing.com via a web browser or mobile app with an internet connection and agrees to the privacy policy and terms of service.
* **Main Flow:**
  1. The user navigates to the registration page on Bing.com.
  2. The user enters their email address, phone number, or selects a social network account (e.g., Microsoft Account) to register.
  3. The system verifies the provided information and sends a confirmation (e.g., email or SMS).
  4. The user confirms their registration by following the instructions in the confirmation message.
  5. The system creates the account and logs the user in as an Authorized User.
* **Alternative Flow:**
  1. **A1: Invalid Input**
     1. At Step 2, the user enters an invalid email address, phone number, or selects an unsupported social network account.
     2. The system displays an error message (e.g., "Invalid email format" or "This social network is not supported").
     3. The user corrects the input and resubmits.
     4. Return to Main Flow Step 3.
  2. **A2: Confirmation Failure**
     1. At Step 4, the user does not receive the confirmation message due to a network issue or incorrect contact details.
     2. The system provides an option to resend the confirmation.
     3. The user requests a resend, and the system sends a new confirmation.
     4. Return to Main Flow Step 4.
* **Postconditions:** The user’s account is successfully created, and they can access personalized features as an Authorized User.

### Use Case 2: Password Recovery

* **ID:** 2
* **Brief Description:** Recovering a forgotten password for a Bing.com account through a secure process.
* **Primary Actor:** Authorized User
* **Preconditions:** The user has forgotten their password and has access to the registered email or phone number used during account creation.
* **Main Flow:**
  1. The user navigates to the password recovery page on Bing.com.
  2. The user enters their registered email address or phone number.
  3. The system sends a reset link or verification code via email or SMS.
  4. The user follows the link or enters the code to set a new password.
  5. The system updates the password and allows the user to log in.
* **Alternative Flow:**
  1. **A1: Unrecognized Email/Phone**
     1. At Step 2, the user enters an email or phone number not associated with any account.
     2. The system displays an error message (e.g., "No account found with this email/phone").
     3. The user re-enters a valid email/phone or chooses to register a new account.
     4. If valid, return to Main Flow Step 3; otherwise, redirect to Use Case 1 (Register).
  2. **A2: Expired Reset Link/Code**
     1. At Step 4, the user attempts to use an expired reset link or verification code.
     2. The system displays an error message (e.g., "This link/code has expired").
     3. The user requests a new reset link/code, and the system resends it.
     4. Return to Main Flow Step 4.
* **Postconditions:** The user’s password is successfully reset, and they can access their account.

### Use Case 3: Authorization (Login)

* **ID:** 3
* **Brief Description:** Logging into a Bing.com account using valid credentials.
* **Primary Actor:** Authorized User
* **Preconditions:** The user has an active Bing.com account and internet access.
* **Main Flow:**
  1. The user navigates to the login page on Bing.com.
  2. The user enters their email/phone and password, optionally using multi-factor authentication (MFA) for added security.
  3. The system verifies the credentials and logs the user in as an Authorized User.
  4. The user accesses personalized features and services.
* **Alternative Flow:**
  1. **A1: Incorrect Credentials**
     1. At Step 2, the user enters an incorrect email/phone or password.
     2. The system displays an error message (e.g., "Incorrect email or password").
     3. The user re-enters credentials or selects "Forgot Password" (redirect to Use Case 2).
     4. If credentials are valid, return to Main Flow Step 3.
  2. **A2: MFA Failure**
     1. At Step 2, the user enables MFA but fails to enter the correct verification code.
     2. The system displays an error message (e.g., "Invalid code").
     3. The user requests a new code, and the system resends it.
     4. Return to Main Flow Step 3.
* **Postconditions:** The user is successfully logged in and can interact with Bing.com as an Authorized User.

### Use Case 4: Logout

* **ID:** 4
* **Brief Description:** Logging out of a Bing.com account to end the session securely.
* **Primary Actor:** Authorized User
* **Preconditions:** The user is currently logged into their Bing.com account.
* **Main Flow:**
  1. The user navigates to the account settings or profile page.
  2. The user selects the logout option.
  3. The system ends the session and redirects the user to the Bing.com homepage or login page.
* **Alternative Flow:**
  1. **A1: Session Timeout**
     1. Before Step 1, the system automatically logs the user out due to inactivity (e.g., after 30 minutes).
     2. The system redirects the user to the login page with a message (e.g., "Session expired").
     3. The use case ends without user action.
* **Postconditions:** The user is successfully logged out, and their session is terminated securely.

### Use Case 5: Perform Search

* **ID:** 5
* **Brief Description:** Entering a search query and receiving relevant results (web, image, video, news) on Bing.com.
* **Primary Actor:** Unregistered/Unauthorized User, Authorized User, Educational/Organizational User
* **Preconditions:** The user has access to Bing.com via a web browser or mobile app with an internet connection.
* **Main Flow:**
  1. The user enters a search query (keywords or phrases) into the search bar.
  2. The system displays real-time autocomplete suggestions (included Use Case: Use Autocomplete Suggestions).
  3. The user submits the query or selects a suggestion.
  4. Bing.com processes the query and returns relevant results within 500 milliseconds.
  5. The user views and interacts with the search results.
* **Alternative Flow:**
  1. **A1: No Results Found**
     1. At Step 4, the system finds no relevant results for the query.
     2. The system displays a message (e.g., "No results found. Try refining your search").
     3. The user modifies the query and resubmits.
     4. Return to Main Flow Step 4.
  2. **A2: Network Failure**
     1. At Step 4, the system fails to process the query due to a lost internet connection.
     2. The system displays an error message (e.g., "No internet connection").
     3. The user reconnects and resubmits the query.
     4. Return to Main Flow Step 4.
* **Postconditions:** The user receives and views relevant search results, and the system logs the query for analytics (if permitted by privacy settings).

### Use Case 6: Use Autocomplete Suggestions

* **ID:** 6
* **Brief Description:** Receiving real-time autocomplete suggestions while typing in the search bar on Bing.com.
* **Primary Actor:** Unregistered/Unauthorized User, Authorized User, Educational/Organizational User
* **Preconditions:** The user is interacting with the search bar on Bing.com.
* **Main Flow:**
  1. The user begins typing in the search bar.
  2. The system displays autocomplete suggestions within 200 milliseconds of each keystroke.
  3. The user selects a suggestion or continues typing.
* **Alternative Flow:**
  1. **A1: No Suggestions Available**
     1. At Step 2, the system cannot generate suggestions due to an uncommon query or system error.
     2. The system displays no suggestions or a message (e.g., "No suggestions available").
     3. The user continues typing or submits the query manually.
     4. Return to Main Flow Step 3.
* **Postconditions:** The user receives suggestions to refine their query, and the system updates the search interface accordingly.

### Use Case 7: View Content

* **ID:** 7
* **Brief Description:** Viewing search results or additional content (e.g., images, videos, news, maps) on Bing.com with optimal readability and multimedia support.
* **Primary Actor:** Unregistered/Unauthorized User, Authorized User, Educational/Organizational User
* **Preconditions:** The user has performed a search or navigated to a specific content page on Bing.com.
* **Main Flow:**
  1. The user selects a search result or content item from the results page.
  2. The system displays the content (e.g., text, images, videos) with appropriate formatting, fonts, and multimedia (e.g., audio, video).
  3. The user zooms in/out or navigates using links, breadcrumbs, or a sitemap as needed.
* **Alternative Flow:**
  1. **A1: Broken Link or Unavailable Content**
     1. At Step 2, the selected content is unavailable (e.g., broken link, removed page).
     2. The system displays an error message (e.g., "Content not found").
     3. The user returns to the search results and selects another item.
     4. Return to Main Flow Step 1.
  2. **A2: Multimedia Failure**
     1. At Step 2, multimedia (e.g., video) fails to load due to a browser or network issue.
     2. The system displays an error (e.g., "Failed to load video").
     3. The user refreshes the page or selects alternative content.
     4. Return to Main Flow Step 2.
* **Postconditions:** The user successfully views and interacts with the content, and the system tracks usage for analytics (if permitted).

### Use Case 8: Navigate the Site

* **ID:** 8
* **Brief Description:** Navigating Bing.com using internal and external links, a sitemap, or breadcrumbs to access pages or sections.
* **Primary Actor:** Unregistered/Unauthorized User, Authorized User, Educational/Organizational User
* **Preconditions:** The user is logged into Bing.com (if authorized) or accessing it as an unregistered user.
* **Main Flow:**
  1. The user clicks on internal links, breadcrumbs, or accesses the sitemap from any page on Bing.com.
  2. The system redirects the user to the selected page or section (e.g., search results, help center, news).
* **Alternative Flow:**
  1. **A1: Invalid Link**
     1. At Step 1, the user clicks a broken or outdated link.
     2. The system displays an error page (e.g., "404 - Page Not Found").
     3. The user uses breadcrumbs, sitemap, or search to find the desired page.
     4. Return to Main Flow Step 2.
* **Postconditions:** The user reaches the desired page or section, and the system tracks navigation for analytics (if permitted).

### Use Case 9: Access Help Center

* **ID:** 9
* **Brief Description:** Accessing Bing.com’s Help Center to find answers to common questions or troubleshoot issues.
* **Primary Actor:** Unregistered/Unauthorized User, Authorized User, Educational/Organizational User
* **Preconditions:** The user has access to Bing.com via a web browser or mobile app with an internet connection.
* **Main Flow:**
  1. The user navigates to the Help Center section on Bing.com.
  2. The user searches for or browses FAQs, tutorials, or support articles.
  3. The system displays relevant information to assist the user.
* **Alternative Flow:**
  1. **A1: No Relevant Information**
     1. At Step 3, the system cannot find relevant FAQs or articles for the user’s issue.
     2. The system suggests contacting support (redirect to Use Case 12).
     3. The user follows the suggestion or retries with a different query.
     4. Return to Main Flow Step 2.
* **Postconditions:** The user finds the required information or resolves their issue, and the system logs the access for analytics (if permitted).

### Use Case 10: Interact with the System (for Authorized User)

* **ID:** 10
* **Brief Description:** Engaging with Bing.com through interactive features like reviewing, commenting, sharing content, contacting support, and providing feedback.
* **Primary Actor:** Authorized User
* **Preconditions:** The user is logged into their Bing.com account with valid credentials and has internet access.
* **Main Flow:**
  1. The user selects an interactive feature (e.g., review content, share on social media).
  2. The system provides the interface for the interaction (included Use Case: Share Content on Social Networks).
  3. The user completes the action (e.g., posts a review, shares content).
* **Alternative Flow:**
  1. **A1: Interaction Failure**
     1. At Step 3, the action (e.g., posting a review) fails due to a system error or invalid input.
     2. The system displays an error message (e.g., "Failed to post review").
     3. The user corrects the input or retries the action.
     4. Return to Main Flow Step 3.
* **Postconditions:** The interaction is completed (e.g., review posted, content shared), and the system updates records and logs the activity (if permitted by privacy settings).

### Use Case 11: Share Content on Social Networks

* **ID:** 11
* **Brief Description:** Sharing search results, news, images, or videos from Bing.com on social media platforms.
* **Primary Actor:** Authorized User
* **Preconditions:** The user is logged into their Bing.com account and has access to a social media account.
* **Main Flow:**
  1. The user selects a piece of content (e.g., search result, news article) on Bing.com.
  2. The user clicks the “Share” button and chooses a social network (e.g., Twitter, Facebook).
  3. The system facilitates sharing with a single click, including a link and optional comment.
* **Alternative Flow:**
  1. **A1: Social Network Authentication Failure**
     1. At Step 3, the user’s social network account is not authenticated or logged out.
     2. The system prompts the user to log into the social network.
     3. The user logs in and retries sharing.
     4. Return to Main Flow Step 3.
* **Postconditions:** The content is successfully shared on the selected social network, and the system logs the action (if permitted).

### Use Case 12: Contact Support via Dedicated Channels

* **ID:** 12
* **Brief Description:** Contacting Bing.com support through dedicated channels (e.g., contact form, live chat) for account or search-related issues.
* **Primary Actor:** Authorized User
* **Preconditions:** The user is logged into their Bing.com account and has internet access.
* **Main Flow:**
  1. The user navigates to the support section on Bing.com.
  2. The user submits a query via a contact form or initiates a live chat with support staff.
  3. The system processes the request and provides a response within 30 seconds (for live chat) or 24 hours (for email).
* **Alternative Flow:**
  1. **A1: Delayed Response**
     1. At Step 3, the system cannot respond within the expected time due to high volume.
     2. The system notifies the user (e.g., "We’re experiencing delays; expect a response within 48 hours").
     3. The user waits for a delayed response or escalates via another channel.
     4. Return to Main Flow Step 3.
* **Postconditions:** The user receives assistance or a resolution, and the system logs the support ticket for tracking.

### Use Case 13: Provide Feedback via Surveys or Polls

* **ID:** 13
* **Brief Description:** Participating in surveys or polls on Bing.com to provide feedback on user experience, features, or performance.
* **Primary Actor:** Authorized User
* **Preconditions:** The user is logged into their Bing.com account and receives a prompt to participate in a survey or poll.
* **Main Flow:**
  1. The user receives a survey or poll notification on Bing.com.
  2. The user completes and submits their feedback through the provided interface.
  3. The system processes the feedback and acknowledges the submission.
* **Alternative Flow:**
  1. **A1: Submission Failure**
     1. At Step 2, the feedback submission fails due to a network error.
     2. The system displays an error message (e.g., "Submission failed. Please try again").
     3. The user retries submitting the feedback.
     4. Return to Main Flow Step 3.
* **Postconditions:** The user’s feedback is recorded, and the system uses it to improve Bing.com (if permitted by privacy settings).

### Use Case 14: Manage User Account

* **ID:** 14
* **Brief Description:** Managing a Bing.com account, including creating, updating, configuring, and recovering account details.
* **Primary Actor:** Authorized User
* **Preconditions:** The user is logged into their Bing.com account with internet access.
* **Main Flow:**
  1. The user navigates to the account settings page.
  2. The user selects an account management action (included Use Case: Configure Notification Preferences).
  3. The system processes the action and updates the account details.
* **Alternative Flow:**
  1. **A1: Invalid Action**
     1. At Step 2, the user attempts an invalid action (e.g., entering an already-used email).
     2. The system displays an error message (e.g., "Email already in use").
     3. The user corrects the input and retries.
     4. Return to Main Flow Step 3.
* **Postconditions:** The user’s account is successfully managed, and the system updates records and logs the activity (if permitted).

### Use Case 15: Configure Notification Preferences

* **ID:** 15
* **Brief Description:** Customizing notification settings for account activities, search alerts, rewards, or new features on Bing.com.
* **Primary Actor:** Authorized User
* **Preconditions:** The user is logged into their Bing.com account.
* **Main Flow:**
  1. The user navigates to the notification preferences section in account settings.
  2. The user selects or modifies notification options (e.g., email, SMS) for various activities.
  3. The system saves the preferences and sends a confirmation.
* **Alternative Flow:**
  1. **A1: Save Failure**
     1. At Step 3, the system fails to save preferences due to a server error.
     2. The system displays an error message (e.g., "Failed to save preferences").
     3. The user retries saving the preferences.
     4. Return to Main Flow Step 3.
* **Postconditions:** The user’s notification preferences are updated, and the system applies the changes immediately.

### Use Case 16: Recover Forgotten Password

* **ID:** 16
* **Brief Description:** Recovering a forgotten password for a Bing.com account through a secure process.
* **Primary Actor:** Authorized User
* **Preconditions:** The user has forgotten their password and has access to the registered email or phone number.
* **Main Flow:**
  1. The user requests password recovery on the login page.
  2. The system sends a reset link or verification code via email or SMS.
  3. The user follows the link or enters the code to set a new password.
* **Alternative Flow:**
  1. **A1: Incorrect Verification Code**
     1. At Step 3, the user enters an incorrect verification code.
     2. The system displays an error message (e.g., "Invalid code").
     3. The user requests a new code, and the system resends it.
     4. Return to Main Flow Step 3.
* **Postconditions:** The user’s password is reset, and they can log in with the new password.

### Use Case 17: Delete or Deactivate Account

* **ID:** 17
* **Brief Description:** Deactivating or permanently deleting a Bing.com account, ensuring secure data erasure.
* **Primary Actor:** Authorized User
* **Preconditions:** The user is logged into their Bing.com account and wishes to leave the platform.
* **Main Flow:**
  1. The user navigates to account settings and selects the option to delete or deactivate their account.
  2. The system prompts for confirmation and explains the consequences (e.g., data loss).
  3. The user confirms the action, and the system processes the request.
  4. The system securely removes or anonymizes the user’s data within 30 days, per privacy regulations.
* **Alternative Flow:**
  1. **A1: User Cancels Action**
     1. At Step 3, the user decides not to confirm the deletion/deactivation.
     2. The system cancels the request and returns the user to the account settings page.
     3. The use case ends without further action.
* **Postconditions:** The user’s account is deactivated or deleted, and their data is removed in compliance with legal requirements.

### Use Case 18: Perform Search (Advanced)

* **ID:** 18
* **Brief Description:** Entering an advanced search query and receiving curated, specialized results (e.g., academic, business) on Bing.com.
* **Primary Actor:** Educational/Organizational User
* **Preconditions:** The user has access to Bing.com via a web browser or mobile app with an internet connection.
* **Main Flow:**
  1. The user enters an advanced search query with specific filters (e.g., scholarly articles, patents).
  2. The system displays real-time suggestions (included Use Case: Use Advanced Filters).
  3. The user submits the query, and Bing.com returns curated results within 500 milliseconds.
  4. The user views and interacts with the advanced search results.
* **Alternative Flow:**
  1. **A1: Filter Misapplication**
     1. At Step 3, the user applies incompatible filters (e.g., no results match criteria).
     2. The system displays a message (e.g., "No results with these filters").
     3. The user adjusts the filters and resubmits.
     4. Return to Main Flow Step 3.
* **Postconditions:** The user receives and views relevant, specialized search results, and the system logs the query for analytics (if permitted).

### Use Case 19: Use Advanced Filters

* **ID:** 19
* **Brief Description:** Applying advanced filters (e.g., scholarly, business) to refine search results on Bing.com.
* **Primary Actor:** Educational/Organizational User
* **Preconditions:** The user is performing an advanced search on Bing.com.
* **Main Flow:**
  1. The user selects advanced filter options (e.g., date, location, content type) during a search.
  2. The system applies the filters and updates the search results within 200 milliseconds.
  3. The user reviews the refined results.
* **Alternative Flow:**
  1. **A1: Filter Application Delay**
     1. At Step 2, the system delays updating results due to a processing error.
     2. The system displays a loading message (e.g., "Processing filters…").
     3. The user waits or retries the filter application.
     4. Return to Main Flow Step 2.
* **Postconditions:** The user receives refined search results based on the selected filters, and the system logs the action (if permitted).

### Use Case 20: Interact with the System (for Educational/Organizational User)

* **ID:** 20
* **Brief Description:** Engaging with Bing.com through specialized interactive features for educational or organizational purposes.
* **Primary Actor:** Educational/Organizational User
* **Preconditions:** The user or organization has an active Bing.com account or subscription with appropriate permissions and internet access.
* **Main Flow:**
  1. The user selects an interactive feature (e.g., utilize Bing Ads, collaborate via Microsoft tools).
  2. The system provides the interface for the interaction (included Use Case: Utilize Bing Ads for Marketing Campaigns).
  3. The user completes the action (e.g., launches a campaign, shares results).
* **Alternative Flow:**
  1. **A1: Permission Denied**
     1. At Step 1, the user lacks permission for the selected feature (e.g., Bing Ads).
     2. The system displays an error (e.g., "You don’t have access to this feature").
     3. The user contacts support or upgrades their account.
     4. Return to Main Flow Step 1 if resolved.
* **Postconditions:** The interaction is completed (e.g., campaign launched, content shared), and the system updates records and logs the activity (if permitted by privacy settings).

### Use Case 21: Utilize Bing Ads for Marketing Campaigns

* **ID:** 21
* **Brief Description:** Creating, managing, and optimizing advertising campaigns on Bing.com for educational or organizational promotion.
* **Primary Actor:** Educational/Organizational User
* **Preconditions:** The user has access to Bing Ads with appropriate permissions and an internet connection.
* **Main Flow:**
  1. The user navigates to the Bing Ads platform within Bing.com.
  2. The user creates or edits an ad campaign, targeting specific audiences and setting budgets.
  3. The system processes the campaign and tracks performance metrics (e.g., clicks, impressions).
* **Alternative Flow:**
  1. **A1: Budget Exceeded**
     1. At Step 2, the user sets a budget exceeding their account limit.
     2. The system displays an error (e.g., "Budget exceeds limit").
     3. The user adjusts the budget or adds funds.
     4. Return to Main Flow Step 3.
* **Postconditions:** The campaign is launched and monitored, and the system logs performance data for analysis.

### Use Case 22: Provide Institutional Feedback

* **ID:** 22
* **Brief Description:** Submitting detailed feedback, surveys, or reports on Bing.com usage for institutional purposes.
* **Primary Actor:** Educational/Organizational User
* **Preconditions:** The user is prompted to provide feedback or has access to the feedback interface.
* **Main Flow:**
  1. The user receives a survey or report prompt on Bing.com.
  2. The user completes and submits institutional feedback through the provided interface.
  3. The system processes the feedback and sends an acknowledgment.
* **Alternative Flow:**
  1. **A1: Incomplete Submission**
     1. At Step 2, the user submits incomplete feedback (e.g., missing required fields).
     2. The system displays an error (e.g., "Please complete all required fields").
     3. The user corrects and resubmits.
     4. Return to Main Flow Step 3.
* **Postconditions:** The user’s feedback is recorded, and the system provides a report or response within 48 hours.

### Use Case 23: Engage with Community Features for Organizational Purposes

* **ID:** 23
* **Brief Description:** Participating in Bing.com’s online forums or community boards to discuss educational or business topics.
* **Primary Actor:** Educational/Organizational User
* **Preconditions:** The user has access to Bing.com’s forums and is logged into their account.
* **Main Flow:**
  1. The user navigates to the Bing.com forums or community boards.
  2. The user posts a question, shares insights, or responds to other users’ posts.
  3. The system displays the post within 5 seconds and logs the interaction.
* **Alternative Flow:**
  1. **A1: Post Rejection**
     1. At Step 2, the user’s post violates community guidelines (e.g., spam).
     2. The system rejects the post and displays a message (e.g., "Post violates guidelines").
     3. The user revises and resubmits the post.
     4. Return to Main Flow Step 3.
* **Postconditions:** The user’s post is visible in the community, and the system updates records for analytics (if permitted).

### Use Case 24: Contact Support for Institutional Needs

* **ID:** 24
* **Brief Description:** Contacting Bing.com support through dedicated channels for institutional requirements (e.g., bulk search issues, privacy concerns).
* **Primary Actor:** Educational/Organizational User
* **Preconditions:** The user or organization has an active Bing.com account and internet access.
* **Main Flow:**
  1. The user navigates to the support section for institutional users.
  2. The user submits a query via priority email, phone, or a dedicated account manager.
  3. The system processes the request and provides a response within 24 hours.
* **Alternative Flow:**
  1. **A1: No Dedicated Manager Available**
     1. At Step 2, no dedicated account manager is available for the user’s query.
     2. The system redirects the user to standard support with a note (e.g., "Manager unavailable; rerouting").
     3. Return to Main Flow Step 3.
* **Postconditions:** The user receives specialized assistance, and the system logs the support ticket for tracking.

### Use Case 25: Access Multilingual Support

* **ID:** 25
* **Brief Description:** Switching between languages or viewing content in the user’s preferred language on Bing.com.
* **Primary Actor:** Authorized User, Educational/Organizational User
* **Preconditions:** The user is logged into their Bing.com account and has internet access.
* **Main Flow:**
  1. The user navigates to the language settings on Bing.com.
  2. The user selects their preferred language from the available options.
  3. The system updates the interface and content to the selected language within 3 seconds.
* **Alternative Flow:**
  1. **A1: Unsupported Language**
     1. At Step 2, the user selects a language not supported by Bing.com.
     2. The system displays a message (e.g., "This language is not available").
     3. The user selects an alternative supported language.
     4. Return to Main Flow Step 3.
* **Postconditions:** The user views Bing.com in their preferred language, and the system logs the preference (if permitted).

### Use Case 26: Manage Content

* **ID:** 26
* **Brief Description:** Managing content on Bing.com, including creating, editing, deleting, scheduling, and publishing via the Content Management System (CMS).
* **Primary Actor:** Moderator
* **Preconditions:** The Moderator has authorized access to the CMS and internet connectivity.
* **Main Flow:**
  1. The Moderator logs into the CMS on Bing.com.
  2. The Moderator selects a content management action (included Use Case: Schedule Content Publishing).
  3. The system processes the action and updates the content as required.
* **Alternative Flow:**
  1. **A1: Unauthorized Access**
     1. At Step 1, the Moderator lacks sufficient permissions for a specific action.
     2. The system displays an error (e.g., "Permission denied").
     3. The Moderator escalates to an admin or logs in with higher privileges.
     4. Return to Main Flow Step 1.
* **Postconditions:** The content is successfully managed, and the system logs the action for auditing.

### Use Case 27: Schedule Content Publishing

* **ID:** 27
* **Brief Description:** Scheduling content (e.g., news, images, videos) for future publication on Bing.com via the CMS.
* **Primary Actor:** Moderator
* **Preconditions:** The Moderator has access to the CMS and has created or edited content.
* **Main Flow:**
  1. The Moderator selects the scheduling option in the CMS.
  2. The Moderator sets a date and time for content publication.
  3. The system schedules the content and confirms the action.
* **Alternative Flow:**
  1. **A1: Invalid Date/Time**
     1. At Step 2, the Moderator sets an invalid or past date/time.
     2. The system displays an error (e.g., "Invalid schedule date").
     3. The Moderator corrects the date/time and retries.
     4. Return to Main Flow Step 3.
* **Postconditions:** The content is scheduled for publication, and the system updates the CMS records.

### Use Case 28: Analyze Statistics

* **ID:** 28
* **Brief Description:** Tracking and analyzing website performance, traffic, user behavior, and search trends on Bing.com via the Statistics Dashboard.
* **Primary Actor:** Moderator, Educational/Organizational User (if authorized)
* **Preconditions:** The Moderator or authorized user has access to the Statistics Dashboard and internet connectivity.
* **Main Flow:**
  1. The user logs into the Statistics Dashboard on Bing.com.
  2. The user selects metrics to analyze (e.g., traffic, bounce rate, search keywords).
  3. The system displays real-time insights within 10 seconds.
* **Alternative Flow:**
  1. **A1: Data Unavailable**
     1. At Step 3, the system cannot retrieve statistics due to a server error.
     2. The system displays a message (e.g., "Data temporarily unavailable").
     3. The user retries or waits for system recovery.
     4. Return to Main Flow Step 3.
* **Postconditions:** The user receives actionable insights, and the system logs the analysis for reporting.

### Use Case 29: Manage Users

* **ID:** 29
* **Brief Description:** Managing user accounts on Bing.com, including viewing, editing, locking, unlocking, or deactivating accounts.
* **Primary Actor:** Moderator
* **Preconditions:** The Moderator has authorized access to user management tools and internet connectivity.
* **Main Flow:**
  1. The Moderator logs into the user management interface on Bing.com.
  2. The Moderator selects a user account and performs a management action (e.g., lock, edit, send notification).
  3. The system processes the action and updates the account status.
* **Alternative Flow:**
  1. **A1: User Not Found**
     1. At Step 2, the Moderator searches for a non-existent user.
     2. The system displays an error (e.g., "User not found").
     3. The Moderator verifies the user ID and retries.
     4. Return to Main Flow Step 2.
* **Postconditions:** The user account is successfully managed, and the system logs the action for auditing.

### Use Case 30: Ensure Safety Requirements

* **ID:** 30
* **Brief Description:** Implementing and enforcing safety measures on Bing.com, such as content filtering, misinformation mitigation, and child safety protocols.
* **Primary Actor:** Moderator
* **Preconditions:** The Moderator has access to safety tools and internet connectivity.
* **Main Flow:**
  1. The Moderator monitors content or user interactions on Bing.com.
  2. The Moderator applies safety measures (e.g., activates SafeSearch, flags misinformation).
* **Alternative Flow:**
  1. **A1: False Positive Flag**
     1. At Step 2, the Moderator flags safe content as unsafe by mistake.
     2. The system logs the action, and another Moderator reviews it.
     3. The review overturns the flag, and the content is restored.
     4. Return to Main Flow Step 2.
* **Postconditions:** Safety measures are enforced, and the system logs the actions for compliance.

### Use Case 31: Ensure Security Requirements

* **ID:** 31
* **Brief Description:** Protecting Bing.com against security threats, such as phishing, malware, and unauthorized access, using advanced detection tools.
* **Primary Actor:** Moderator
* **Preconditions:** The Moderator has access to security tools and internet connectivity.
* **Main Flow:**
  1. The Moderator monitors search results or system logs for security threats.
  2. The Moderator identifies and blocks threats (e.g., phishing links, malware) and updates security protocols.
* **Alternative Flow:**
  1. **A1: Threat Detection Failure**
     1. At Step 2, the Moderator misses a subtle threat (e.g., disguised phishing link).
     2. The system’s automated tools later detect and flag it.
     3. The Moderator reviews and blocks the threat.
     4. Return to Main Flow Step 2.
* **Postconditions:** Security threats are mitigated, and the system logs the actions for auditing.

2. Use-Case diagrams of use cases that implement functional requirements.



