A Preliminary Exploration of County-Level Media Convergence Microservices Cloud Platform Construction (Postprint)

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Abstract

Focusing on addressing the pain points in the construction of county-level media convergence centers, this paper introduces a "County-level Media Convergence Microservices Cloud Platform" constructed using microservices architecture. Centered on media convergence construction, the platform leverages big data, cloud computing, and artificial intelligence technologies to achieve integrated media management for one-time production and multi-terminal distribution. This enables rapid construction or interfacing with various county-level media convergence centers and their sub-centers, thereby satisfying the personalized requirements of different localities and communication demands under new circumstances.

Full Text

Preamble

Title: A Preliminary Study on the Construction of County-Level Media Convergence Microservices Cloud Platform

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Abstract: Addressing the pain points in the construction of county-level media convergence centers, this paper introduces the "County-Level Media Convergence Microservices Cloud Platform" built on a microservices architecture. Centered on media convergence construction and leveraging big data, cloud computing, and artificial intelligence technologies, the platform achieves integrated media management for one-time production and multi-terminal distribution. It enables rapid construction or integration with county-level media convergence

centers and their branches, meeting localized personalization needs and communication demands in the new era.

Keywords: media convergence; county-level media convergence; cloud platform; microservices; modularization

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1. Microservice Architecture

Microservice architecture divides a single application into a set of fine-grained services that implement business logic through service invocation and integration. Its core concept utilizes independently deployable microservices to realize application business functions, with each service performing a specific function. This architecture represents an improvement upon SOA (Service-Oriented Architecture), differing in structural composition: while SOA employs a heavyweight ESB (Enterprise Service Bus), microservice architecture adopts a lightweight service gateway. Microservice architecture features componentization, loose coupling, autonomy, and decentralization, manifested through fine-grained services, single service responsibilities, independent deployment and operation, independent scaling, and independent development and evolution.

2. Platform Construction

On August 21-22, 2018, at the National Conference on Propaganda and Ideological Work, General Secretary Xi Jinping delivered an important speech, stating that "we must solidly advance the construction of county-level media convergence centers to better guide and serve the masses," thereby setting the national strategic direction for county-level media convergence development. Currently, the construction of county-level media convergence centers commonly faces challenges including funding shortages, talent scarcity, and weak technical capabilities. During the convergence process, some local software platforms overly rely on provincial platforms with limited personalization and monolithic models, failing to meet diverse localized needs. The development of mobile internet has brought both new challenges and opportunities for county-level media convergence.

To address these pain points, we have launched the "County-Level Media Convergence Microservices Cloud Platform" based on microservice architecture. Utilizing big data, cloud computing, and AI technologies, the platform centers on media convergence construction, integrating various communication channels including newspapers, radio, television, websites, clients, microblogs, and official accounts. It achieves integrated media management for one-time production and multi-terminal distribution, enabling rapid construction or integration with county-level media convergence centers and their branches. The platform facilitates shared utilization of content, users, activities, and services, with its

tool services and data analytics capabilities effectively meeting the personalized needs of county-level media. Integration between county-level media platforms and provincial platforms further satisfies county-level communication demands.

2.1 Construction Principles

The platform was planned, designed, and built following fundamental principles of meeting media convergence development, prioritizing practicality, and comprehensively considering cost-effectiveness and security.

2.1.1 Simplicity and Mobile-First: The design emphasizes easy management and maintenance with simple operations and convenient configuration. The platform is compatible with both PC and mobile terminals, achieving comprehensive integration and unified publishing across all media formats. Users can access platform functions after logging in with their accounts on either PC or mobile devices. The platform strengthens mobile-first awareness, implements a mobile-first strategy, and focuses on developing mobile products.

2.1.2 Unified Management and Security Control: The platform fully considers security in storage, operations, and backup. Centralized management of platform accounts serves media organizations at all levels, functional departments, and county-level media convergence centers. Servers are rationally configured with comprehensive firewall settings to ensure system and data security.

2.1.3 Intensive Development and Collaborative Sharing: The platform integrates various media resources and production elements, coordinates the use of communication platforms and information technology, revitalizes resources, optimizes allocation, stimulates vitality, and forms synergies to improve comprehensive utilization rates. It provides cloud-based manuscript and material libraries for text, images, and video, enabling shared publishing content. All users are both consumers and producers—using platform functions and resources while also producing resources for others.

2.2 Content Services

The platform provides high-quality content resource services, establishing an unstructured shared resource library and a manuscript and material sharing mechanism. It offers cloud-based manuscript and material libraries for text, images, video, and H5 formats, breaking down barriers between media and achieving connectivity and sharing of content resources.

2.3 Tool Services

The platform provides content production-related tool services, supporting lightweight and convenient mobile editing. Users can edit text, images, and audio-video materials anytime and anywhere on mobile devices, with customizable review processes. The platform offers visual editors suitable for new media production, enabling journalists and editors to quickly create

attractive H5 or short video products using templates without graphic design skills. The platform also has the capability to analyze and identify sensitive content, providing content proofreading, portrait analysis, and post-publication monitoring services for content security.

2.4 Data Services

Big data analytics supports decision-making. The platform collects data resources including online media content, public opinion data, various platform accounts and message boards, and data from New Era Civilization activities. Using big data analytics technology, it provides various data services including hotspot discovery, public opinion analysis, communication path analysis, performance evaluation, and production assessment, offering references for media development and government decision-making.

3. Platform Microservice Granularity Division

Following principles of fine granularity, single service responsibility, service independence, and deployment isolation, service types are vertically divided according to the business functions of the county-level media convergence cloud platform, as shown in Figure 2 [Figure 2: see original paper].

3.1 Core Services

3.1.1 Command Dashboard Service: This service enables visual presentation of communication effect analysis and public opinion trends, outputting to large screens for centralized display. It integrates with clue management, command dispatch, and video live streaming modules to achieve large-screen command and monitoring.

3.1.2 Information Reporting and Instruction Transmission Service: This service facilitates information reporting and instruction transmission channels between provincial, municipal, and county-level propaganda authorities, between propaganda authorities and other relevant departments, and among media under their jurisdiction. It supports reporting of multiple information types and statistical analysis of departmental data, providing a basis for production assessment.

3.1.3 Web Conference Service: This service provides a multimedia conference platform enabling video conferences between propaganda authorities at various levels and between authorities and their subordinate media. It supports remote meetings, resource sharing, collaborative work, remote training, and online classrooms.

3.1.4 Standard Channel Service: This service builds standard channels on media platforms such as news websites and clients at all levels, embedding the voices of the central party and provincial committees into the home screens of provincial, municipal, and county-level clients and websites.

3.1.5 Public Opinion Monitoring Service: This service monitors public opinion information related to the county in real-time across the entire internet (including Weibo, WeChat, forums, etc.), providing instant alerts and information push. It offers real-time feedback on public opinion generated by content published by the media convergence center and has a clue aggregation function to provide richer 线索 support for news planning.

3.2 News Management Module

3.2.1 News Planning Service: The clue management function aggregates news clues reported by various media while conducting big data analysis on internet-wide data to present the hottest news clues. The topic planning function allows users to identify key topics, general topics, and shooting topics based on daily reported topics, refine publicity plans, and execute them after leadership approval.

3.2.2 News Interview Service: The news material library function allows frontline journalists to upload text, images, and audio-video through PCs or mobile devices. Journalists can edit manuscripts and process news materials in the material library. The video live streaming function supports multi-camera, multi-device live broadcasting, backstage directing, and multi-platform distribution. The all-media activity function enables all-media 联动 reporting for important thematic coverage and major events, establishing reporting groups for convenient communication, interviewing, and transmission. The journalist location function tracks news event locations in real-time to facilitate command of frontline reporting.

3.2.3 News Editing Service: The content editing library function allows journalists to submit text, images, and audio-video materials for editors to process. The sensitive word alert function marks sensitive words during collection, editing, and browsing. The full-process traceability function records all operations and review processes, supporting full traceability and version comparison for content production. The audio-video editing function supports online editing of audio and video, enabling live recording compilation, short video quick editing, and material refinement. AI functions provide intelligent proofreading, intelligent dubbing, intelligent recognition, intelligent discovery, intelligent security inspection, and intelligent assistance tools to improve editing efficiency.

3.2.4 News Publishing Service: The one-click publishing function enables publication of reviewed news content to newspapers, websites, clients, microblogs, and other platforms with automatic terminal adaptation to ensure content integrity. The all-media matrix function comprehensively utilizes multiple terminals within the county including newspapers, internal publications, radio, village loudspeakers, news websites, WeChat, mobile newspapers, electronic newspaper kiosks, and outdoor large screens to form an all-media matrix and strengthen publicity effects.

3.2.5 Performance Evaluation Service: The communication effect analysis

function monitors the online communication paths and hot words of manuscripts published by the media convergence center in real-time, automatically generating multi-dimensional analysis charts and using quantitative communication effects to evaluate and assess journalists and relevant departments.

3.3 Resource Services

3.3.1 Resource Library Service: Manuscripts published by various media automatically enter the "cloud manuscript library" of the media convergence platform. Additionally, news data resources generated on newspapers, websites, clients, WeChat, Weibo, and platform accounts are stored to create a comprehensive news information database. Through data analysis and mining, the platform achieves redevelopment and reuse of data resources.

3.3.2 Copyright Tracking Service: This service enables real-time queries of the reprinting status of manuscripts, images, videos, and H5 materials in users' cloud manuscript and material libraries. Platform users can sign copyright exchange agreements or conduct settlements with each other.

3.4 "Media+" Module

3.4.1 Government Affairs Management Service: This service integrates with the government affairs management system of the "Government Cloud" platform, primarily including: online government inquiry function for handling citizen consultations and complaints, allowing the public to submit requests and inquiries through websites, clients, microblogs, and other media, with backend connectivity to local units to process public demands and evaluate units based on "response speed" and "satisfaction rate" ; government information disclosure function for units to timely release government information to the public.

3.4.2 Public Services: This service primarily integrates with the public service system of the "Government Cloud" platform, including: administrative appointment function for government service appointments to save citizens' waiting time in service halls; smart city function for promoting diversified public service integration, connecting with government department data, establishing "effective connections"between media and the public, and becoming a "service window" in citizens' pockets; public inquiry function for uploading merchant information and contact details, which platform staff review and publish after verification, increasing merchant exposure while bringing convenience to citizens' lives.

4. Platform Technical Features

Based on microservice architecture and according to county-level media convergence center requirements, the platform leverages microservice advantages by dividing platform functions into multiple services following principles of fine granularity, single service responsibility, and independent deployment. Platform

functions are realized through integrated combination and invocation among services.

The platform provides application grouping and modular management. Through scheduling and distribution by a global load balancer, different functional services are grouped and managed modularly. By dynamically adjusting the number of member nodes in each application service group horizontally, the platform meets performance and availability requirements under different scenarios.

The platform emphasizes a mobile-first principle, focusing on video live streaming. It provides convenient mobile planning, collection, editing, and publishing management, supporting simple mobile office operations. For live streaming, the platform supports both push and pull streaming methods and supports quality switching.

Through integration with Alibaba Cloud, Tencent AI, and Baidu Brain, the platform achieves AI capabilities supporting intelligent search, intelligent content port allocation, and intelligent identification of content sources and attributes. It supports facial recognition, subtitle recognition, and speech synthesis in video content to assist content production.

The platform integrates data analysis, computing, and statistical models, utilizing its own media resource data, user data, and government data. According to the needs of county-level media convergence centers, it customizes different dimensions and types of application scenarios, providing data services including hotspot discovery, public opinion analysis, communication path analysis, and performance evaluation to serve as references for media development and government decision-making.

The "County-Level Media Convergence Microservices Cloud Platform" is a media convergence service platform built on microservice architecture, employing big data, cloud computing, and artificial intelligence technologies. Centered on media convergence construction, it integrates various communication channels including newspapers, television, websites, clients, microblogs, and official accounts, achieving integrated media management for one-time production and multi-terminal distribution. Currently, the platform has been deployed in multiple regions and units, achieving good results and receiving positive feedback. It provides services and assistance for news reporting work, significantly improving news business capabilities and effectively enhancing the daily work efficiency of journalists.

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Note: Figure translations are in progress. See original paper for figures.