

**Cinder Pipeline Improvements: Automation of Droplet Administrative Overhead**

(Technical Paper)

**The Potential Effects of Artificial Intelligence in Healthcare within the United States**

(STS Paper)

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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## **General Research Problem**

*What are the social implications of information and communication technologies (ICT)?*

We are living in the information age. The information age started in the 1970s with the rise of ICT: the internet, personal computers, fiber optic cables, faster microprocessors, the World Wide Web, and Email (Nguyen, 2019). The current social implications of ICT are complex and double-edged. ICT provides global connection, accessible information, and work flexibility. But ICT can cause decreased mental and physical health, cultural homogenization, unemployment, loss of individual privacy, and other ethical issues (Castells, 1999).

## **Cinder Pipeline Improvements: Automation of Droplet Administrative Overhead**

*How can the manual administrative overhead the Amazon EC2 Nitro Firmware Team (NFT) spends on running the Cinder Qualification Testing pipeline be automated?*

I will write about my independent Amazon internship project through a Capstone course offered by the Computer Science department under Professor Rossane Vrugtman.

The NFT spent around 130 hours of weekly manual work on obtaining droplet loans and generating host config files to run the Cinder Qualification Testing Pipeline. My project focused on creating a system to automate this droplet administrative overhead.

Previously implemented automation systems focus on a specific use case. Kazlauskas and Picus (1990) implemented automated systems for educational administration using microcomputers, and Ganger, Strunk, and Klosterman (2003) for brick storage using AI and control systems. Since automation systems are specialized, previously existing systems would not directly apply to NFT's needs.

Therefore, I designed an automation system specialized for droplet administrative overhead. The system utilized a droplet capacity management service (re:Stack) to obtain droplet loans and a python script plus an internal API (AskEC2 Coral) to generate the host config files. The system eliminated around 130 hours of weekly manual work and provided scalability and maintainability for ongoing Cinder development. In the future, NFT needs permanent team registration to use the AskEC2 Coral API.

### **The Potential Effects of Artificial Intelligence in Healthcare within the United States**

*In the U.S., how are healthcare providers, medical professionals, ICT developers, advocacies, and patients competing to influence the integration of artificial intelligence in medicine?*

Artificial intelligence (AI) may transform healthcare. In 2021, AI systems in healthcare accounted for \$6.7 billion of the market (Kwo, 2021). AI systems can make fast, accurate, and informed decisions by analyzing patterns from vast datasets. AI has applications in research, patient diagnosis, drug development and delivery, and administration (Davenport & Kalakota, 2019). AI in healthcare has complex implications for care infrastructure, regulation, ethics, data quality, and the physician-patient relationship (Rajkomar, 2019).

Researchers have investigated the struggles over AI in medicine. Panch, Mattie, and Celi (2019) contend that new healthcare infrastructure is necessary to support data collection and to remodel healthcare delivery. Matheny et al. (2022) argue that regulation has not kept pace with technological innovation. Salwei and Carayon (2022) propose a sociotechnical systems approach to AI design and implementation. Verghese, Shah, and Harrington (2018) remind physicians that they are the decision-makers. AI guides professionals' decisions; it is no substitute for them.

Participants include patients and the advocacies that represent them; physicians and the professional associations that represent them; hospitals, other healthcare providers, insurers, and their respective trade associations; and technology developers, researchers, and the advocacies that represent them.

Some patients fear errors in treatment, high costs, and loss of privacy (Ward, 2019). The National Patient Advocate Foundation seeks affordable, equitable, and effective patient care through advocacy, coalition building, and outreach (NPAF, 2021). A sister organization, the Patient Advocate Foundation, offers patients financial aid and case management services (PAF, 2018).

Many physicians anticipate that AI will improve medical care. Dr. Obermeyer of the University of California hopes that with AI, medical professionals “can fundamentally transform not just the delivery of medicine but also the science underlying it” (Ward, 2019). Some physicians, however, fear that medical AI may undermine physicians’ discretion, exacerbate socioeconomic disparities, and promote profit agendas. Dr. Char of Stanford University Medical Center cautions: “the values of AI designers or the purchasing administrators are not necessarily the values of the bedside clinician.” Char fears that system developers may be more interested in “improving profit or finessing evaluation metrics” than in improving care (Ward, 2019). The American Medical Association (AMA) is the only national association of physicians. AMA (2022) influences national health policy and defends the interests of its health professionals.

UnitedHealth Group is the largest U.S. health insurance company. It claims to “expand access to high-quality health care so people get the care they need at an affordable price” (UnitedHealth Group, 2022). However, American health insurance companies are for-profit entities notorious for opaque and inequitable pricing (Rosenthal, 2017).

The Allegiance for Artificial Intelligence in Healthcare represents technology developers, pharmaceutical companies, and research organizations and promotes AI systems in healthcare by establishing standards and publishing research (AAIH, 2001). The American Board of Artificial Intelligence in Medicine represents clinicians and data scientists and promotes AI in healthcare through education and a certification exam (ABAIM, 2021).

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