SPIN SYS
CLOUD MIGRATION SOLUTIONS
CAN SAVE YOUR BUSINESS BOTH **TIME AND RESOURCES.**

HOW WE HELP

SpinSys planned, managed, and conducted the largest cloud migration project within the Defense Health Agency (DHA) to date, involving the full transition of the Military Health System (MHS) Information Platform (MIP)—an entire data center and all hosted solutions and services—from the on-premises (on-prem) enclave at the Navy Data Center to AWS GovCloud. SpinSys is an integrated provider of enterprise IT solutions, including cost-effective and efficient private and public cloud solutions. As a broad spectrum technology integrator, we provide value-added experience and services above and beyond what is offered directly by public cloud service providers such as Amazon, Microsoft, or Google.

SpinSys provides a comprehensive range of cloud services including stabilizing and migrating legacy enterprise applications to cloud-hosted environments, developing migration plans and roadmaps and solution refactoring tailored to transition applications into a public, private, or hybrid cloud. We enable our clients to utilize solutions designed to meet their precise needs for security, collaboration, virtualization, and rationalization.

With the dynamics of an operational expense (OpEx) model offering "pay as you go" pricing and tailored provisioning via on-demand delivery of IT resources and applications, SpinSys Cloud Solutions can help your business or government agency with the following:

• Reducing Infrastructure Cost

Cloud-hosted applications reduce deployment and operational costs by elastic resource sharing across multiple applications, without requisite real estate, electricity, and other costs associated with on-prem hosting.

• Building Scalability

Cloud-based applications can scale in response to an unplanned transactional volume, without costly downtime for an infrastructure upgrade or constrained resources based on increased demand. You only pay when you consume computing resources, and only for how much you actually consume.

• Increasing Agility

Traditional procurement processes to provision a new computing environment or provide technology refresh often involve large capital expenses (CapEx). Conversely, in the cloud environment, new resources can be provisioned with just a few clicks or using automated cloud formation scripts.

• Going Global

Easily and centrally implement a global presence in multiple regions around the world for lower latency, redundancy and backup, better customer experience, and minimal cost.

WHAT WE DO

SpinSys has successfully deployed complex cloud-based solutions for commercial and federal customers and is partnered with cloud computing industry leaders including Amazon, Microsoft, and Google. With in-depth experience in Amazon Web Services (AWS)-based cloud offerings, SpinSys is an AWS Technology Partner with AWS-certified professionals specializing in the stabilization, modernization, and continuous optimization of legacy applications as they transition into the cloud. We have similar capabilities tailored to implement MS Azure cloud solutions. SpinSys uses our proven agile engineering methodology to conduct a cloud computing assessment and perform design, development, implementation, and ongoing managed operations in the cloud. As a vendor-agnostic provider of private and public cloud migration of legacy applications, SpinSys is uniquely experienced to help you optimize your solutions within an appropriate cloud-hosted environment.

CASE STUDY:
Accelerated Cloud Migration Project for DHA's Military Health System Information Platform

SpinSys planned, managed, and conducted the largest cloud migration project within the Defense Health Agency to date, involving the full transition of the MIP—an entire data center and all its hosted solutions and services—from the on-prem enclave at the Naval Information Warfare Center (NIWC), Charleston, SC to AWS GovCloud. The Accelerated MIP Cloud Transition Project overhauled the underlying MIP infrastructure while transforming the funding approach from a CapEx model to an OpEx model with "Pay as you go and only for what you need" Infrastructure as a Service (IaaS) in AWS GovCloud. AMP liberated NIWC and DHA from key challenges and drawbacks such as capacity estimation, depreciation, over-provisioning, and disposition of assets associated with long-term physical data center operations for the MIP.

Not only was AMP the largest DHA cloud transition project to date, but it was also at a heightened cybersecurity level: DOD Impact Level 4 (IL4). AMP involved migrating massive amounts of

personally identifiable information (PII) and personal health information (PHI) for DHA's **>9.5 million** beneficiaries into virtual private clouds (VPCs) hosted in AWS GovCloud. It included **migrating petabyte-scale databases** of secondary use healthcare data, testing and adopting AWS cloud-native services (CNS) to supplement the **60+** existing MIP solutions, and consolidating hundreds of physical servers into virtual instances in AWS GovCloud. As a direct result of AMP, DHA will avoid hardware refresh costs for **300+** legacy on-prem physical servers.

SpinSys was uniquely qualified to successfully deliver this high profile cloud transition for NIWC and DHA. As the original architect and developer of the MIP (the largest secondary use of healthcare data) with a three-layer core platform for DHA data management and business operations, SpinSys has provided mission-critical healthcare IT services to DHA and its predecessor agencies, such as the Air Force Medical Support Agency Surgeon General, for nearly **20 years.** As an AWS Technology Partner, we led enabling projects to: (a) establish and accredit the Defense Health Community of Interest (DHCOI) Cloud Access Point (CAP) for use of AWS GovCloud at IL4; and (b) implement the Cloud Pathfinder project including the first successful migration of an existing DHA application to AWS GovCloud: the Knowledge Exchange Cloud Pathfinder (KxCP), later rebranded as Knowledge Exchange Cloud Pad.

SpinSys completed the MIP Cloud transition in just **93 days**, and all specified solutions were accredited and operational in AWS GovCloud over one year in advance of the initial target date: an **84% reduction** in schedule. We orchestrated a "Team of Teams" collaborative effort including three NIWC Integrated Product Teams (IPTs); three DHA divisions; the Program Executive Office, Defense Health Management Systems (PEO DHMS); multiple solutions and hundreds of users within three DHA Directorates (J5, J6, and J9); and **20+** industry partners. SpinSys provided dozens of technical specialists in AWS cloud integration, MIP solution architecture, systems engineering, software development and testing, big data management, cybersecurity, communications, and DOD healthcare project management. Using an innovative and accelerated Risk Management Framework (RMF) review process, **we obtained four Rapid Authorization to Operate (ATO) accreditations** (for the MIP Data, Logic, and Presentation Layers; and DHA's new MHS Platform as a Service or PaaS) in **<4 months.** Successful migration to AWS GovCloud in advance of the initial schedule enabled DHA to begin reaping the benefits of the IaaS resources with an OpEx model, and to decommission and dispose of end-of-life hardware earlier than expected. In early June 2020, SpinSys finalized the transition of the MIP's key applications and databases to a fully accredited AWS GovCloud-hosted environment.

> "The DHA's successful MIP Cloud Transition project has been the fastest of its type conducted in the history of AWS to date."

— Senior Manager, AWS Professional Services

BACKGROUND

DHA manages all in-garrison healthcare for MHS beneficiaries (active duty, reserve, National Guard, veterans, and family members) including all of their electronic healthcare records (EHR). The MIP serves a wide variety of stakeholders serving the MHS community, including: (a) clinicians, pharmacists, researchers, data scientists/analysts, and administrators working at 788 military treatment facilities (MTFs) worldwide; (b) thousands of civilian medical facilities that accept TRICARE enrollees; (c) all DOD Services and Components; (d) DHA; (e) and the Veterans Health Administration (VHA). Key drivers for migrating the MIP to the cloud included, among others, the perpetual costs of hardware and software technology refreshes and the ongoing vulnerability of aging data center equipment.

WORK PERFORMED

MIP AWS Cloud Proof-of-Concept: In 2018, SpinSys successfully planned, managed, and conducted the Cloud Pathfinder project including roadmap development and a successful proof-of-concept migration of DHA's KxCP application to AWS GovCloud. KxCP is a SharePoint-based enterprise content management and collaboration tool that hosts items such as documents, materials and guidance, that can be shared with their field counterparts. The KxCP uses forms-based authentication and is accessible via .mil and .com to all users with a DOD CAC and PIV cards and is currently used worldwide by the Army, Navy, USAF, USMC, and the VA. KxCP became the first DHA application to be accredited and deployed in AWS GovCloud under IL4 cybersecurity.

MIP Transition to AWS GovCloud: Based on the successful KxCP proof-of-concept demonstration, in February 2020, DHA Director Lt. Gen. Ronald Place designated the AMP as a major priority for the agency, thus providing key Command-level support and accountability. AMP required the entire MIP data center to be fully operational in AWS GovCloud in16 weeks from the kickoff date. SpinSys worked with NIWC, DHA, other DOD components, AWS Professional Services and external software providers to develop complex solution architectures for a total of four VPCs. These cloud architectures extend across multiple accreditation boundaries and contain dozens of AWS Security Groups. We coordinated with AWS to provision initial AWS Elastic Compute Cloud (EC2) instances to operate the MIP pre-production environment for software Development and Security Operations (DevSecOps), as well as AWS Simple Storage Services (S3) buckets for data storage. We developed and deployed AWS Cloud Formation

MIP Cloud Transition

MIP Enclave in Cloud

1 Information Discovery and Validation → **2** Design and Build Plan → **3** Installation/ Configuration → **4** Risk Management Framework (RMF) Accreditation → **5** User Testing & Operations **93 days**

Templates (CFTs) to simplify provisioning of MIP Cloud resources. In addition to online data migration through the DHCOI CAP, we used 80 Terabyte -capacity AWS Snowball devices and 100 TB-capacity AWS Snowball Edge devices for secure bulk data transfer to AWS-hosted resources.

Under AMP, SpinSys performed key overhaul and modernization of the MIP, concurrent with migration to AWS GovCloud, including: (a) transition of the infrastructure from on-prem to the cloud; (b) implementation of DHA's new enterprise offering for Virtual Desktop Interface (VDI) and Help Desk; (c) major revision of Role Based Access Control (RBAC) policies; (d) business process reengineering; and (e) switchover from a CapEx funding model to an OpEx model. We migrated all on-prem data to AWS GovCloud S3 buckets and compressed them, **reducing the required storage space by 85%**. We also **migrated 60+ MIP applications**, and solutions, refactoring them as necessary to operate optimally in AWS GovCloud. All data migration was conducted as a seamless backend transition, invisible to the MIP user community. To minimize potential service disruption, domain name server changes and full transitions were conducted over the weekend to decommission on-prem resources. We conducted all smoke, unit, and function testing, coordinated user confidence tests by MIP stakeholders in an incremental manner and mitigated cutover risk by ensuring potential issues were transparently addressed prior to transitioning to the cloud environment.

SpinSys converted all MIP physical servers operating in the on-prem data center to AWS EC2 instances in GovCloud resulting in a **61% total footprint reduction** (and a 100% reduction in terms of Government-owned and operated hardware and data center real estate). At least 300 of the on-prem physical servers had been scheduled for priority technology refresh; therefore, AMP eliminated the immediate technical refresh costs by migrating the MIP to the cloud with its OpEx funding model. SpinSys is also aiding NIWC and DHA in obtaining approval-for-use of 14 AWS CNS within the DHA AWS ecosystem, which will augment existing MIP solutions and introduce new capabilities to the MIP platform and DHA's broader portfolio. The elasticity and OpEx funding model of cloud computing will strongly support "pay as you go" exploration and utilization of additional next-generation solutions by MIP

users, such as machine learning, to build increasing analytics capabilities and natural language processing, useful for interpreting EHRs and ensuring semantic interoperability. AWS CNS within the DHA AWS ecosystem will augment existing MIP solutions and introduce new capabilities to the MIP platform and DHA's broader portfolio.

Cybersecurity: SpinSys prepared all technical and cybersecurity artifacts for the RMF submittals and **obtained four Rapid ATOs** from the DHA authorizing official in **<4 months** (compared to the historical cycle time of 1 year to obtain a single ATO). Leveraging our previous expertise designing and deploying the DHCOI CAP's Virtual Datacenter Security Stack (VDSS) for DHA, we designed and implemented robust MIP and MHS PaaS Cloud enclaves, enabling all hosted solutions to operate at IL4. Combined with MIP-specific cybersecurity resources, the VDSS provides defense-in-depth for the enclave, including zero day detection and defense and other proactive protection tools. SpinSys' installation, configuration, and cyber-hardening of MIP solutions enabled the MIP Cloud to become the first DHA product to operate at this heightened security level. We coordinated with enterprise contacts to design and implement robust authentication and authorization processes operable for the MIP and MHS PaaS VPCs, with users of front-end solutions such as CarePoint retaining their Single Sign-on (SSO) capability post-migration to ensure a seamless transition. We have implemented the planned cybersecurity activities across the four VPCs (MIP and MHS PaaS), including 100% scanning of assets and identification and mitigation of CAT 1 vulnerabilities for environments accredited at IL4.

AWS GovCloud MIP IaaS Optimization: SpinSys has engaged with NIWC and DHA to right-size provisioning of AWS compute and storage resources, as part of an optimization and cost containment initiative for the MIP IaaS assets. We are continually focused on assessing and tailoring storage utilization, which has to date generated substantial cost reductions. By dramatically slashing the Procurement Acquisition Lead Time (PALT), the cloud environment allows us to provision and decommission resources rapidly and with minimal effort in response to changes in utilization, using cloud-native CFTs and AWS Lambda functions. SpinSys' creation and implementation of S3 lifecycle policies will automate

> "[The Accelerated Migration Project demonstrated] the federal Government can be a source of record-breaking speed and platform innovation … with improved and lasting outcomes."
>
> **— Senior Federal IT Manager**

storage tiering and result in additional cost savings while meeting data storage and retrieval requirements.

DHA Cloud-Hosted MHS PaaS: In addition to transitioning the MIP to the cloud, SpinSys provisioned and accredited a separate VPC for the new MHS PaaS. As a flexible development platform for all defense health solutions (including MIP assets), the MHS PaaS will feature Red Hat OpenShift containerization and an automated DevSecOps integration process, with multiple check gates for quality assurance and quality control prior to deployment of new or revised code. When fully deployed in AWS GovCloud in 2021, the MHS PaaS will host numerous critical DHA solutions, including the MIP's upgraded Agile Core Services Data Access Layer (ACS DALv3.0), and operate using an OpenShift enterprise container environment. The OpenShift container environment will provide dynamic scaling and auto-provisioning of resources, continuous monitoring and repair of infrastructure, and protection against cybersecurity vulnerabilities through container isolation. A DevSec-Ops pipeline will be provided, with rigorous, automated software testing and release processes, which will be applied to all new code and code upgrades. Microservices will deconstruct Service Oriented Architecture (SOA) modules into simple, lightweight code to maximize flexibility and deployment speed. These code packages can be used either stand-alone or in aggregate, as dictated by each web service or application. We will continue to use software such as SharePoint, Visual Studio, and JavaScript to create customizable user-facing websites and portals (e.g., presentation of healthcare data from databases or data warehouses that are dynamically updated), sustaining the "look and feel" end users are accustomed to experiencing within the MIP.

CONCLUSIONS AND PATH FORWARD

In this case study, SpinSys has jump-started DHA's future of Cloud Computing. The MIP's technical architecture is now built on top of a combination of DHA Enterprise Services and Commercial Services (AWS GovCloud), which will allow for: (a) increased responsiveness and flexibility in provisioning; and (b) use of CNS for data storage, management, and analytics. We enhanced the MIP's cybersecurity posture with a defense-in-depth strategy and associated tools and best practices. The MIP's users will be able to perform critical daily business functions more cost-effectively in the cloud, and leverage evolving technologies such as machine learning and NLP—helping DHA support the delivery of integrated, affordable, and high quality health services to MHS beneficiaries.

SpinSys has seamlessly transitioned from DHA's Accelerated Migration Project to providing technical support for post-AMP activities. Among ongoing objectives are focusing on continued high-quality operation of MIP apps and solutions in AWS GovCloud, while exploring strategies to further optimize cost-effectiveness of the platform. One such strategy includes leveraging CNS capable of handling data at great scale. SpinSys has developed and tested tailored software to enable use of AWS Redshift for MIP data warehousing. By analyzing the initial months of operating data, SpinSys has already identified and implemented additional strategies for stabilizing and optimizing MIP IaaS resource utilization, leading to reduced cloud usage costs. Furthermore, DHA has selected SpinSys to lead its MS Azure Cloud Trailblazer, leveraging the best practices we successfully developed and deployed during the AWS KxCP. DHA's ability to leverage services from two of the largest commercial cloud providers could further maximize benefits to the MHS community.

Contact us today
to learn how we can deliver the advantages of a secure cloud environment to your enterprise.

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