

An ongoing partnership protecting the Australia's biodiversity data

Federal Government Department Digital Transformation to AWS Cloud

Before digital archives and cloud storage, the nation's scientific research data was stored in vulnerable hard copies—one fire and vital documentation of plant and animal life across the country would have been lost. But is our valuable information that much safer now? Without consistent system updates and comprehensive data security measures, it may not be.

In 2020, the Integrated Biodiversity Information System (IBIS) team (the group that manages a system holding important National biodiversity data) sought to mitigate this weakness in our modern documentation process by upgrading their system and migrating the outdated environment onto Amazon Web Services (AWS). Navigating the complex transition without jeopardising the data in their care required a trusted partner—Blue Crystal Solutions

The joint venture behind the name IBIS

The government has complex layers of departments with regularly evolving terminology, as Anne Fuchs, Digital Program Manager at IBIS, warned—ahead of her explanation of the organisation's structure.

It begins with the Centre of Australian National Biodiversity Research, a joint venture between the Director of National Parks and the Commonwealth Scientific and Industrial Research Organisation (CSIRO). Within this venture, Fuchs is part of a group called Biodiversity Informatics, which runs the scientific systems that support the venture. This network of systems run across the Australian National Herbarium, the Australian National Botanic Gardens (ANBG), and the National Species List.

IBIS is not technically the name of an organisation, it means Integrated Biodiversity Information System and refers to the set of systems the group manages. They have simply given themselves the shorthand name IBIS to avoid the rapidly changing government terms.

Nationally significant data at risk in aging system

Historically, all the IBIS infrastructure was run through on-site servers at the ANBG. After a period of retirements and changing skillsets within the team, IBIS moved onto CSIRO infrastructure and ran there for several years. However, due to organisational reasons with CSIRO, it became imperative to move IBIS back onto ANBG managed infrastructure.

The problem was, their current software was dangerously out of date, with applications that could stop running at any moment—putting the extensive scientific data they held at risk.



Australian Government
Director of National Parks



About Integrated Biodiversity Information System (IBIS)

IBIS is a set of systems supporting scientific biodiversity research in Australia rather than an 'organisation'. It operates within a joint venture between the Centre of Australian National Biodiversity Research (CANBR) and the Commonwealth Scientific and Industrial Research Organisation (CSIRO), specifically through the Biodiversity Informatics group. IBIS manages a network of scientific systems related to the Australian National Herbarium, the Australian National Botanic Gardens, and the National Species List. It collaborates with the Australian Biological Resources Study (ABRS) to manage public scientific data, curating biodiversity information for national and international institutions.

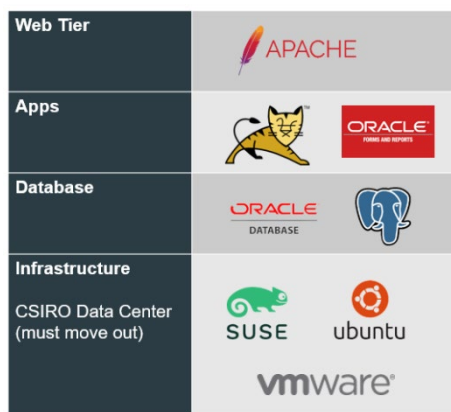


Figure 1 IBIS' Source Environment



Australia-wide records that demanded safe keeping

In the case of the Australian National Botanic Gardens, the data spans 40 years and is used nation-wide for conservation management. The IBIS also holds records of the preserved material at the Australian National Herbarium and the National Species List.

If the IBIS system had failed, all of this nationally significant scientific data—documenting the vital details of all plant and animal life in the country—could have been lost or compromised. IBIS was faced with the challenge of upgrading the software from the ground up and figuring out how to ensure the ongoing sustainability of maintaining the infrastructure.

A cloud platform fit for the project

When those running the transition examined the issue, AWS was chosen as the new cloud platform providing the best fit for the kind of infrastructure IBIS was running and the types of projects they were supporting.

Recommendations within the government

Blue Crystal was already a trusted partner for other sections of the government, and it was their existing relationship with Higher Education Services (HES) that led them to IBIS. CSIRO and HES recommended Blue Crystal's expertise and they were selected as the supplier for transitioning IBIS onto an AWS-hosted environment.

The complexities of transitioning from an outdated system

With so much significant data at risk, there was no room for mistakes. So, Blue Crystal began by mapping out IBIS's current environment:











- Running workshops to discover use cases
- Completing a POC to prove key risks
- Identifying the ideal architecture design and necessary costing

IBIS was running on old, out-of-date servers that made the transition complex—it was up to Blue Crystal to determine how to lift-and-shift the system smoothly onto AWS. The team made the pragmatic decision to recreate the environment from their original system in AWS, ensuring they could move all the data without any complications. Blue Crystal also identified certain goals that were 'future state' and focused on successfully executing the first migration and saving the data from potential loss.

Blue Crystal worked with the team at IBIS to change all the pipelines for deployment, set up S3 for managing data files, and organise the routing, network management, and security—making sure the data was protected from external access. **The end result was a sophisticated environment capable of safely managing the transition.**

"Our transformation framework started with in-depth workshops to evaluate the current environment and use cases, identifying connectivity and restrictions. From there, we proceeded to design, automate, and conduct a proof of concept for high-risk items before moving through pilot, production migration, and managed services, ensuring continuous improvement & cost optimisation at every stage."
Daniel Cox, Chief Technology Architect at Blue Crystal Solutions.

AWS Services Used

Web Tier (Re-architect)	 Amazon Route 53	 AWS Certificate Manager (ACM)	 Amazon CloudFront	 AWS Lambda	 Amazon S3	 Elastic Load Balancing
Apps (Re-host)	 AWS Application Migration Service	 Amazon EC2				
Database (Re-platform)	 Amazon Aurora	 Amazon Relational Database Service (Amazon RDS)				
Infrastructure AWS Sydney	 powered by aws	 AWS Directory Service	 Terraform			

Blue Crystal used extensive AWS services to operate this clean transition and mitigate risk, including:

- Automation and Infrastructure as Code using Terraform.
- Pilot environment using AWS Simple AD with OpenVPN for remote access on EC2.
- Re-host: Lift-and-shift of older Linux instances from VMWare to EC2 using AWS Application Migration Service (CloudEndure).
- Re-platform: Migration of Oracle Enterprise Edition to Standard Edition on RDS using DataPump and Postgres to Aurora.
- Synchronise files from on-premise using Synology NAS with S3 integration.
- Re-architect websites to use Amazon Certificate Manager, CloudFront, Application Load Balancers, and S3, including Lambda@Edge to replace Apache rewrite rules.
- Automated database clones using AWS CLI, including route53 management.

Freedom to focus on high value tasks

After Blue Crystal completed the migration—successfully maintaining all the data from the system and giving IBIS control of their stack again—they began to experience other ongoing benefits as well. With the lower-level services handled by AWS, the team can now focus on the application layer and the product sets they need, rather than spending time on admin-heavy operating tasks.

The IBIS system environment has since been completely upgraded onto a more sustainable level using containers with AWS Fargate, giving the team a platform to keep improving the way they build and deploy applications. Blue Crystal's solution allowed them to take control and carry out change in an incremental way. And as they continue this evolution, they have ongoing access to the knowledgeable team at Blue Crystal, who can help them handle any roadblocks in the future.

An ongoing partnership enhance operational excellence

Just as HES continued to work with Blue Crystal, IBIS has engaged their services since the migration was completed in 2021. The next step in their steady system transformation is improving hosting costs, which will generate even more tangible outcomes for the organisation.

“We’ve really appreciated the depth of knowledge and communication with Blue Crystal around migrating and incrementally improving our sustainability in AWS.” **Anne Fuchs, Digital Program Manager at IBIS.**



Blue Crystal Solutions: A trusted and innovative IT partner

Blue Crystal provide database, cloud, application, and infrastructure services across Australia. They work to empower organisations with the right IT and tech infrastructure to keep data safe, efficient, and geared towards growth.

“Blue Crystal’s approach is always to help us solve the problem in a way that works for us. They’re not dogmatic about how things should be done, they’re very customer focused—it’s about what outcomes are achievable within our constraints.” **Anne Fuchs, Digital Program Manager at IBIS.**

IBIS have continued their support relationship with Blue Crystal leveraging their unmatched expertise in database and cloud management and support.

Public Recognition for Blue Crystal Solutions in demonstrating Digital Transformation Excellence through their work with IBIS.



Winner: AWS Trusted Partner for ‘Public Sector Modernisation’ 2024

Blue Crystal Solutions won AWS’ Trusted Partner for 'Public Sector Modernisation' Accolade in 2024. This award recognises Blue Crystal as a key partner for IBIS, significantly accelerating their pathway to operational excellence with a digital transformation involving leveraging complex cloud technologies to drive innovation and efficiency.

Learn more: bluecrystal.com.au/news/aws-trusted-modernisation-partner



Finalist: ARN Innovation Awards for 'Digital Transformation' 2024

For their work with IBIS, Blue Crystal Solutions has been nominated as a Finalist in the “Digital Transformation” Category with the 2024 ARN Innovation Awards Program. This program recognised IT Partners who have leveraged established and emerging solutions to enhance customer innovation levels, underpinned by deep levels of expertise and specialist services. At time of publication results were still pending.

Learn more: bluecrystal.com.au/news/bcs-finalists-for-arn-innovation-awards-2024/.

About Blue Crystal Solutions

Blue Crystal Solutions is an 100% Australian Based IT managed services company that gives organisations the technology they need to maximise operational efficiency, productivity, and business growth. We provide managed services and consultancy for database, cloud, application, and infrastructure services across Australia and beyond. **Learn more by visiting bluecrystal.com.au**



Our Technology Partnerships fuel our innovative expertise



A payroll system migration to AWS Cloud with thousands of salaries at risk

A cost neutral migration to AWS Cloud with zero services disruptions to 30,000+ staff payroll and no additional Oracle licensing.

The Department for Education in South Australia handles the payroll for thousands of teachers across the state and when they had to migrate their payroll system into a secure cloud environment, there would have been severe consequences if anything went wrong.

Blue Crystal Solutions (Blue Crystal), a company with extensive knowledge in Amazon Web Services (AWS) and Oracle technologies, was the risk-averse choice—a partner that would ensure the system was safely transferred with a robust Public Sector Cloud Adoption Solution. And the results exceeded expectations: a cost-neutral migration that had zero impact on pay runs and improved the system’s efficiency and data security.

About the Department for Education

In Australia, school-level education is handled by each state rather than the federal government, and the Department for Education is SA’s branch. This state department is responsible for delivering public education and care across South Australia, which includes managing the payroll of 32,000 employees.

Enhancing Payroll System Resilience and Data Security

In light of emerging cyber security challenges, the Department for Education has demonstrated a steadfast commitment to technological advancement and robust data security. Guided by this dedication, strategic enhancements have been made to the payroll system, which was previously hosted on infrastructure poised for modernisation. By prioritising the enhancement of data protection and the establishment of solid disaster recovery processes, the Department has not only ensured the continuity of operations but also safeguarded the wellbeing of their educators, thereby reinforcing the resilience of South Australia’s education system against potential threats.

There was no commercial off-the-shelf product that could handle the department’s complex requirements. With a bespoke on-premise payroll system comprising of over 65 interfaces, it would not be a simple transition.

Why AWS?

The Department has already started on their path to host some of their systems in the Cloud, a project to migrate was already in place as a result of a partnership between Department for Education, Blue Crystal, AWS, and Telstra. AWS offered a mature range of tools and products that can be used as the building blocks for hosting the payroll system including networking components such as Gateways, VPCs, Subnets, and Direct Connect, security components such as Security Groups, and NACLs, a wide range of CPU and/or Memory optimised EC2 instances, a wide range of storage and archival solutions with high performance and durability such as S3 and EBS, and the ability to utilise multi-Availability Zones and multi-Regions to extend the availability and recoverability of hosted systems.



**Government
of South Australia**

Department for Education

About Department for Education South Australia

In Australia, school-level education is handled by each state rather than the federal government, and the Department for Education is South Australia’s branch. This state department is responsible for providing a range of integrated education, training and child development services to benefit children, young people and families. These services improve education and developmental outcomes for children through to transition to adulthood, reflecting the commitment to support every child towards their aspirations.



Choosing a risk-free local partner

The Department for Education needed an experienced partner to manage the transition to a cloud-based system.

The Department was looking for a partner who could not only validate the feasibility of cloud migration and leverage existing licensing investment but also mitigate risk through a staged approach, restricted access, and real-time cloud monitoring. This wasn't just a plug-and-play solution, it was a complex process with multiple moving parts—and that's where the extensive experience of Blue Crystal was the perfect fit.

Connected through their strategic local partners at Telstra Purple, the department was attracted to Blue Crystal's deep knowledge of AWS & Oracle technologies and engaged them as a direct result.

"We wanted to work with a local company that had the expertise and knowledge to do this. We didn't want to reinvent the wheel and do this ourselves, we mitigated risk using Blue Crystal Solutions' expertise." – **Simon Chapman, Assistant Director, Digital Architecture & Operations, Department for Education**

An efficient but meticulous public cloud migration

Although they had taken on a high-pressure project, Blue Crystal knew they could simply follow their usual process. They kicked things off with their Primesize service which was used to generate a workload report and from that, enabled Blue Crystal to create a Target Architecture Report of the system's workload to ensure it fit within the currently available Oracle licensing. This report included recommended designs and options and was presented to the department before beginning the transition.

The next step was a Proof-of-Concept (POC) to ensure the process would meet performance requirements and eliminate the risk of any failures during the migration. Blue Crystal provided a detailed migration plan to ensure the department could stay compliant with their licenses, and then implementation began.

The migration wasn't without its challenges, ultimately justifying the department's choice in a safe partner. Blue Crystal had to navigate using AWS Direct Connect to bypass the public internet, retention of some on-premises applications, and meticulous planning for a seamless integration. Blue Crystal used a range of AWS services for the process including:

- EC2 z1d instances using the Optimize CPU options
- Transit Gateway
- S3

Smooth public cloud migration that generated multiple benefits

The Department for Education's payroll system was successfully migrated to the new system, which brought several immediate benefits.

Their payroll processing is now up to 50% faster, they have reduced incidents around system reliability, eliminated complexities and costs of large-scale capital replacements, and improved data security and redundancy. The migration itself was also cost-neutral in terms of software licensing and there was no impact on pay runs during the change.

Business Impact

- No impact on pay runs for the 32,000+ Staff
- Improved payroll processing time: up to 50% faster
- Improved security posture
- Redundancy
- Cost Neutral Migration
- Remove complexities and cost of large-scale capital replacement every 5 years

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Blue Crystal provide database, cloud, application, and infrastructure services across Australia. They work to empower organisations with the right IT and tech infrastructure to keep data safe, efficient, and geared towards growth.

Department for Education South Australia have continued their support relationship with Blue Crystal leveraging their unmatched expertise in database management and support.

[WATCH: Department for Education SA builds a stronger future in education with Blue Crystal Solutions & AWS](#)



Public Recognition for Blue Crystal Solutions in demonstrating Cloud Excellence through their work with Department of Education South Australia.



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