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CLIENT: Performance Software Corporation  
PROJECT: Case studies  
OBJECTIVE: Improve an engineering firm's approach to case study format and narrative  
SUMMARY: An initial case study for PSW's proprietary avionics-safety platform afterwards turned into multiple studies involving aerospace and defense customers  
WEBSITE: <https://www.psware.com/case-study-performance-jets/>  
<https://www.psware.com/case-study-jets-for-avionic-systems/>  
<https://www.psware.com/case-study-flight-management-system-fms-for-us-navy>

# Performance JETS: Ushering in a new era of avionics platform virtualization for avionics systems

## Hardware “digital twin” shortens client’s development cycle and reduces cost

### The Problem

One of the world’s top systems suppliers was building a next-generation computing platform for Boeing’s commercial aircraft. Its initial attempt to repurpose an existing military platform for commercial use presented a number of unforeseen challenges. Fatal bottlenecks formed since the three target hardware sets available were not enough to support the large team of 47 developers necessary for testing at the required rate. This created much more work than was originally anticipated against a razor-thin timeline. Having worked with Performance Software on previous programs, the supplier knew this was a partner who was well-versed in safety-critical software and able to consistently deliver on time.

### The Solution

Performance Software quickly realized that existing processes and technology simply were not good enough, particularly with the supplier already running behind schedule. Moreover, problem debugging capabilities were inadequate, further increasing turnaround time for generating tests. Facing an immovable deadline, Performance Software decided to take a brand-new approach that would eliminate the usual need for hardware at this stage and accelerate all steps. JETS, a virtual machine (VM) that emulates the target hardware, was born out of need and opened up new opportunities to redefine how software is developed.

JETS served as a digital twin to the platform’s target hardware by running identical object code in a virtual environment. This replacement shortened the development timeline by enabling real-time systems integration until the hardware was ready. JETS also introduced a sophisticated debugger that increased both the amount and quality of information offered for each problem report while reducing the amount of time necessary to run that report (from two weeks for a single test to four hours). Errors could now be found and fixed faster with little to no disruption to other parts of the system. All of this was accomplished from JETS’s new desktop management client, which cut additional time and costs by eliminating tedious, lengthy lab hours.

The resulting on-time delivery pulled in the end date for the client’s customer’s large program by avoiding potential delays to future steps. Thrilled to have met its customer’s high expectations against all odds, JETS continues to be used today to reduce schedule risk, enjoy hardware cost reduction, improve team morale (avoids night shifts at the lab) and increase software quality.

### The Results

**Accelerated Testing:** JETS completed development and testing 300% faster for \$800,000 in cost savings and problem reports 50% faster for an additional \$200,000 in cost savings.

\$1,000,000 savings via project speed

**Lab Reduction:** On average, JETS saved the supplier 10 hours for each problem report while improving report quality and introducing new levels of convenience through desktop management.

8,000+ hours saved on problem reports

**Hardware Independence:** The client achieved over \$300,000 in savings on hardware shipsets required for the large test team to meet the critical airplane schedule.

\$300,000 hardware savings

**Customer Satisfaction:** The client was extremely happy, particularly due to JETS’s ability to help recover the mission-critical testing schedule.

New, exclusive systems partnership formed

# Performance JETS: A major leap forward with virtual machines (VM) for avionics systems

## Hardware “digital twin” redefines development efficiency and reduces client costs

### The Problem

A leading global systems supplier was building a Flight Management System (FMS) for a major aircraft manufacturer. Lacking the resource capacity with this unique engineering expertise, the supplier was in jeopardy of missing schedule, which would have jeopardized aircraft delivery to major airlines. Because of the larger-than anticipated scope tied to this highly-complex system, two main tasks required outside help: low-level requirements development and associated test creation and execution.

Without adequate development resources and the looming aircraft-certification milestone approaching, the company brought in Performance Software, a trusted technical partner from previous programs. The supplier provided Performance Software with all “available” target hardware, totaling 20 test units. Unfortunately, given the schedule crunch, this was 50 units short of what was needed to avoid missing the critical delivery schedule.

### The Solution

With over 19,000 tests required in short order, a faster, more efficient way of testing was clearly needed. Understanding that such limited hardware would severely impact the program's success due to lab resource “wait states” and poor debugging productivity, Performance Software deployed its JETS virtual machine (VM) to recover schedule.

In conjunction with the supplier's development team, the JETS team quickly implemented the VMs required for the new platform and immediately accelerated the timeline. All 70 developers could conduct the 19,000 tests in parallel since the 50 not working with the 20 hardware units could still test using JETS's virtual desktop client. In doing so, Performance Software not only eliminated the limitation imposed by the hardware, it also took a major leap forward with its VM platform. As a result, the supplier met schedule for the aircraft OEM, which would not have been possible without JETS.

### The Results

**New Levels of Efficiency:** The JETS solution allowed Performance Software to conduct approximately 19,000 tests within the client's timeline.

19,000 tests conducted on time

**Increased Productivity:** All 70 developers could test at the same time with over 70% of the team using the “virtual” target hardware.

100% developer engagement in and out of the lab

**Technological Stepping Stone:** JETS's evolution during this program inspired concepts that are now used by many customers to increase software development efficiency.

Testing breakthroughs in new tech areas

**Customer Satisfaction:** The supplier was highly satisfied with Performance Software's solution and its resourcefulness in helping to meet an otherwise impossible timeline.

PSW rehired for additional work

# Flight management system (FMS): Top talent, efficient structures, and high-quality engineering solutions for US Navy

## FMS expertise in guidance and on-time execution lift client returns

### The Problem

Under contract with a customer involving the Flight Management Computer System for a US Navy aircraft, a world-leading systems supplier determined that it would not be able to assign sufficient in-house resources to meet program goals. The software development and testing of the aircraft's FMS required a high level of expertise in the areas of guidance and navigation, including strong competence with stationary dynamic orbits. Having worked closely with Performance Software on previous projects, the supplier was familiar with the firm's decade-plus track record of providing the highest-quality, full-lifecycle software solutions on over 150 programs covering 30 airframes in the ATS and BRGA markets. It therefore turned to Performance Software, comfortable in knowing that the depth and breadth of the group's expertise at its disposal would allow it to meet this challenge.

### The Solution

Recognizing that it needed to provide a team of exceptional talent with the ability to deliver against hard milestone deadlines, Performance Software quickly assessed its client's needs in order to offer the best plan of action. The Firm-Fixed Price program (FFP) coming out of this exercise was designed to benefit the supplier's existing structure through dedicated resources. Performance Software Project Managers played an ongoing role across two teams, one for development and one for testing, each with its own dedicated leader reporting into an overall program lead responsible for internal and external project management.

The efficiency of this structure combined with the proficiency of Performance Software's talent resulted in a solution that was both highly effective and highly economical. Not only were all deliverables developed and tested on time, but Performance Software's solution resulted in zero escapes, exceeding client expectations. This collectively produced a slate of cost savings for the supplier, which also earned an incentive fee from the project thanks to Performance Software's high-quality engineering solutions in lateral navigation, guidance, and curve.

### The Results

**On-Time Execution:** Performance Software's ability to meet schedule milestones allowed the client to retain incentives from its customer and realize program savings of 10%.

Saved over \$100,000

**Zero Defects:** Firm exceeded expectations by providing a defect-free solution despite 3 anticipated defects. This resulted in program savings of 5%, or \$15,000 per predicted defect.

5% Savings

**Resource Savings:** Program savings of 2% from reduced client oversight, 8% from performance 1.5x faster than the competition, and 4% from unnecessary training costs due to previous collaboration.

1.5X Faster

**Customer Satisfaction:** "I was very happy with PSW. I don't think we would have hit our incentive fee without PSW's help." Client has since retained Performance Software for additional projects.

PSW Re-hired