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Molson Coors Brewing Company - SAP Global Solutions Architect **May 2008 – Present**

Responsible for the technical architecture component of multi-disciplinary SAP projects for MolsonCoors and MillerCoors on a world-wide scale. Among some of the projects executed:

SAP Archiving - Coors

Implementation of SAP Archiving for three separate SAP instances (Production, APO, and SCM) – all ECC 6.0. Archiving objects and retention periods were identified, and archiving (as well as house-keeping cleanup programs) were scheduled (with appropriate variants). From an architecture perspective, OpenText iXOS was used to manage archive objects from the SAP NFS to a Centera storage solution. The latter, in turn unidirectionally replicates to a second Centera box (both located in different datacenters – Markham Ontario and Auburn Hills Michigan). Additionally, Bradmark's solution for table and index re-organization without downtime was implemented.

MCBC Global SAP Console Server Refresh – US and Canada

As a result of the server refresh project, the middleware servers allowing SAP shop floor transactions to run via SAP Console were replaced. The impact is enterprise-wide, and affects connectivity issues for WMS installations in Millers, Coors, and Molson throughout North America. The variations in Vehicle-Mounted Units or VMUs (hardware, OS, Telnet client versions, etc.) and Servers (Telnet servers, SAP Console version compatibility, virtual and actual names, etc.) made this testing complexity a necessary evil that needed to be addresses sooner or later. Considering the fact that SAP Console is Toronto's only shop floor solution, and the timing of baseline image refresh aimed at integrating post Go-Live change requests, sooner proved to be the lesser of both evils. Configuration changes (to be integrated to the new baseline images for VMUs) and business acceptance test results proved to be successful enabling connectivity to both the new and old SAP Consol server infrastructures simultaneously. The SAP Console server refresh is no longer an issue for shop floor devices in Canada, and the new VMU baseline images have taken the changes into consideration.

MCBC SAP Test Data Migration Server (TDMS)

This activity consisted of investigating the benefits of SAP's Test Data Migration Server. Subsequent to a fact-finding and discovery phase, a general report on the benefits was submitted. Among the advantages one finds possible recuperation of disk space, speedy setup and reuse of test environments, etc.

Molson WMS VMU Baseline Image Upgrade

Subsequent to Montreal's WMS Go-Live, changes have been identified that require adjustments to the baseline image for CV60 VMUs. While some of the changes have been made (though not yet deployed), others are still pending and should be incorporated to a refreshed baseline image scheduled for deployment in spring of 2010. A similar situation exists in Toronto. In the hope of standardizing (where possible) and eliminating task and cost duplication, the VMU Baseline Image Refresh has been extended to encompass locations (Montreal and Toronto) and all devices (CV30, CV60, and Symbol 9090) as well as their permutations of operating systems (Windows XP Embedded, Mobile 5, and CE).



Molson WMS Contingency Solution Phase II

The WMS contingency solutions (Phases I and II) were successfully delivered prior to the Toronto Go-Live. To minimize risk, the text-based version (Phase I) of the solution was deployed in the baseline image for Go-Live (even though the SQL Server version – Phase II was ready). With the positive user experience, business acceptance testing was completed shortly after Go-Live, and the text based solution never saw its way to production. Phase II (VMU data capture on local SQL Server CE that replicates with a middleware central instance that posts to SAP) is the current production standard for Toronto.

Considering the ability to maintain warehouse business operations in completely disconnected mode, the contingency solution has become an attractive prospect for other divisions (such as WMS Montreal, and MillerCoors). Consequently, deployment of the contingency Phase II solution has become a project in its own right (considering the variety of VMUs) and is closely tied to the VMU Baseline Image Refresh project that covers shop floor warehouse operations for both Toronto and Montreal. One expects a few minor changes to be required as a result of Montreal's business acceptance testing: the impact of using SAP TRM – Task Resource Management in Montreal but not in Toronto still needs to be determined and evaluated – report still pending.

Molson MRO – Ivara Interface

This project was aimed at outsourcing plant maintenance by having a third party manage maintenance orders and equipment using its own applications and subsequently, update SAP. The business requirements were reviewed, and information exchange infrastructures proposed to the team. The project was put on hold at the vendor selection stage. Since each vendor has their own system, no additional efforts were spent on the data exchange component of this project. Once vendor selection is complete, the project will be re-visited with a higher priority. This should occur in the first half of 2010.

Molson SAP – QM: Vendor Conformity

What was initially considered to be a simple and low cost project, turned out to be more significant as the client's 'nice to have' turned into business requirements. What was to be a simple SAP Notifications IDoc interface project leveraging service provider partnerships already in place, evolved into a SharePoint interface with attachments using K2 middle-layer interfaces to SAP.

The decision to use this approach was mainly motivated by cost savings resulting from technology re-use, and migrating new and upcoming solutions towards a corporate standard. The project has been in execution phase as the first week of January 2010, and should not only set the precedent for future Molson SAP Interface projects but also align well with the upcoming SAP Upgrade.

SAP MII - Molson ELink Replacement

This project began with an urgent need to replace ELink (interface between manufacturing network and corporate network for exchange of recipe and PLC data at breweries in Montreal, Toronto, Vancouver, St-Johns and Moncton) as a result of loss of vendor support due to product



life expiration. Several short-term achievable options were evaluated and considered. When business considered the options, an opportunity was seen to increase business benefits by implementing SAP's xMII Solution and consequently the project scope (and funding requirement) increased. Discovery and fact-finding took place. Commitments were on the verge of taking place when the project was put on hold for new year budgets. It should be re-visited in January of 2010.

SAP Archiving - Molson

Implementation of SAP Archiving for SAP R/3 4.6C. Archiving objects and retention periods were identified, and archiving (as well as house-keeping cleanup programs) were scheduled (with appropriate variants). From an architecture perspective, OpenText iXOS was used to manage archive objects from the SAP NFS to a Centera storage solution. The latter, in turn unidirectionally replicates to a second Centera box (both located in different datacenters – Markham Ontario and Auburn Hills Michigan). Additionally, Bradmark's solution for table and index re-organization without downtime was implemented.

Oracle Upgrade

Upgrade of Oracle from 9i to 10.2 as preliminary project for upgrading SAP from R/3 to ECC 6.0. This consisted of reviewing and approving the project plan, coordinating outage schedules, overseeing post upgrade tests for development, quality assurance (consolidation) and production instances.

SAP CRM

Implementation of SAP CRM for Molson Canada. This consisted of adding a separate client to the CRM landscape found in the UK CRM instance and sitting on the CIC (Customer Interaction Centre) Integration / Governance committee to ensure client-independent code changes are conducive to the evolution of both Canadian and UK installations.

EDI Infrastructure Overhaul

Infrastructure upgrade for EDI transactions executed by Molson Canada from an Alligacom FTP PC-based system to a SAP-PI based data centre solution with Crossgate. This consisted of detailing the process flow, architecture diagrams, establishing the high-level rough order of magnitude for costs, and elaborating the statements of work necessary for delivering the project.

Molson SAP R/3 4.6 – ECC 6.0 Upgrade Assessment

An upgrade assessment team was put together and began a review of requirements and approaches for upgrading the current Molson SAP R/3 4.6 system to ECC 6.0. Once management was advised of the group's findings and project estimates a decision was made to postpone the upgrade to 2010. Even a purely technical upgrade yielded more effort than initially anticipated (for example, there are 108 known interfaces to address resulting in an estimated 222 days of testing). This project was to be revived in the first half of 2010.

Molson – WMS Toronto

Application and Technical Architect for implementation of SAP WMS on ECC6.0 using SAP R/3 4.6 as backend corporate system. The solution consists of a wireless RF environment using SAP Console running on Intermec CV-30 Vehicle Mounted Units (VMUs) bolted to 50 forklifts that ensure 24/7/365 order fulfillment and beer shipping operations. To ensure operations during outages, a Contingency Solution was devised consisting of a disconnected data capture



application that saved to SQL Server CE. Once the outage over, SQL Server replication ensures data migration to a central instance that in turn posts production data to SAP.

The Toronto WMS project was successfully delivered on time and under budget with a projected Go-Live period starting on Friday Sept 18, 2009 at 07:00 AM and ending Monday September 21, 2009 at midnight. By Sunday Sept 20th 2009 (50% into the cutover period) operations were successfully transitioned and the legacy systems were no longer required. They were retired within the following month. The business community and senior management's satisfaction is expressed in terms of a '*...successful and flawless implementation*' as well as a '*...monumental success*'

Molson – WMS Montreal

Post Go-Live support and trouble shooting for implementation of SAP ECC6.0 WMS solution in a wireless, RF environment using Windows XP Embedded Intermec CV-60 Vehicle Mounted Units (VMUs).

MillerCoors - Extended Warehouse Management (EWM)

Decommissioning current Warehouse Information Tracking System (WITS) and replacement with SAP's extended warehouse management solution. This involves implementing a wireless radio frequency (RF) solution for a 30,000 square foot warehouse that uses 60 forklifts to line load (24/7/364) both trucks and railway cars on 2 separate floors. This project is still at the conceptual stage so little details are available at this time.

The objective was to combine best of breed solutions from warehouses located in Toronto (Canada), Montreal (Canada), Shenandoah Valley, Virginia (USA) and implement the selected solutions in Golden, Colorado (USA),

MolsonCoors - eRecruite

Implementation of an electronic recruitment solution (similar to JobBoom) for use by Molson (Canada), Coors (USA), Miller (USA), and Bass (UK) using various SAP technologies such as:

- SAP ECC 6.0
- Netweaver
- SAP Portal
- TREX 7.0
- XI
- Adobe

Responsible for sizing the solution, determining the various components, add-ins, and SP Patch levels for preparation of the server build document. Review, edit, challenge and technically scope business blueprint documents generated by HP-SAP and Molson Coors Subject Matter Experts (SMEs).

GazMetro (Société Commanditée Gaz Métropolitain) **October 2005 - Aug 2007**

Field Service Technician Mobility Projet



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Senior Business Analyst: Mobile-enabling field service technicians: perhaps one of the most demanding and technologically challenging projects undertaken to date. Porting SAP order processing (Sales Orders, Notifications, Measuring Documents, etc.) to the mobile environment using Symbol M70 PDA devices using technologies such as barcodes (Code 128 and PDF417-2D barcodes, Telemetry transponders, Radio Frequency Identification (RFID), 1X and GPRS wireless for synchronizing data between PDA and middleware server), and Global Positioning System (GPS).

Implementing Enterprise application integration (EAI) among such corporate systems as SAP (running on DB2), Click Scheduler, TS (Oracle-based Time Sheet and Reporting System), and SQL Server 2005-based Bell Fleet-LAV (Automated vehicle location and tracking system) to enable automated generation of time sheets and offer management a comprehensive overview via Online Data Store (ODS).

Responsibilities: Needs assessment, project scoping, functional analysis specifications, solution prototyping, documentation, and training.

SAP modules: PM, IS-Utilities, MM, HR, CATS

Development infrastructure: SAP Netweaver, Eclipse, Java, DotNet, Visual Studio 2005

Government of Canada – R.C.M.P. United Nations Peacekeeping Directorate
June 2005 - April 2005

Stock Tracking and Material Issue Solution

Upgrade of stock tracking and issue materiel management application developed in 2001 for the R.C.M.P. (see below) in two distinct infrastructures: Batch hand-held devices and wireless RF hand-held devices. The software is to be configured according to specific needs and limitations of two separate warehouses. The project mainly involves enhancement, configuration and code migration to a wireless platform.

This project will allow the R.C.M.P. to use one common material management solution to stock, issue and track materiel in either desktop, hand-held batch or hand-held RF flavors.

- Application enhancement and performance improvement
- Elimination of middle-layer processing for issues and physical inventory audits performed by PDA.
- Implementation of automated backup system to ensure high availability
- Data cleansing and RDBMS maintenance
- RDBMS upgrade from SQLBase 6.1 to SQLBase 8



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DataMirror Corporation
April 2002 – Oct 2005

Business Process Analyst and Consultant for implementing the Pervasive Gateway middleware (Desktop GUI, Radio Frequency, 1X technology Batch-Mobile data collection devices) for various ERPs. Specializing in field force automation and remote access to SAP, my responsibilities include establishing the desired business process flow with the client (and recommending improvements that streamline processes and maximize ROI), determining business and project expectations, elaborate scoping documents that outline process flows and devise a project plan with the development team. My programming experiences enables me to develop Proof of Concepts (POCs) and prototypes that assist in conveying the end result to the client without monopolizing development resources. Current client consulting includes:

Bell Canada – Physical Inventory and Asset Management (PIAM)

Migration of SAP physical inventory functionality to an offline handheld Pocket PC and integration with Plant Maintenance (install and disassemble equipment) and Material Management Module (both serialized and non-serialized materials). Considerable custom development allows migration of legacy functionality to a middle-ware, off-line environment that communicates with SAP using stand-alone hand-held barcode readers and ASP-based desktop PCs to manage and approve results prior to posting in SAP. Responsibilities include functional and technical specifications, user interface development (ABAP, ASP and Visual Basic for Windows CE), documentation, scoping documents for customer approval and development of recommendations with respect to architectural and IT infrastructure.

McNeil Consumer Products (Johnson and Johnson)

Implementation of accepted proposal for implementation of RF-based SAP material management / warehouse functionality (Goods Issue – Goods Receipt) for multi-national supplier of health care products (i.e. Tylenol). Development of proposal and scoping document (including elaboration of infrastructure, and RF interfaces).

Unifine Reichardson – Analysis and Specifications development for implementation of RF-based warehouse functionality

Multi-national supplier of condiments to major food chains (McDonalds, Wendy's, Burger King, etc.) making use of SAP WM Migration of SAP physical inventory functionality (and custom development) to both RF (real-time) as well as off-line (batch) environments using hand-held barcode readers. Proposal for implementation of new custom functionality at middle-ware level. Responsibilities include functional and technical specifications, user interface development.

Mann and Hummel

Preparation of proposal for implementing robotics interface to SAP for automotive manufacturing firm. PLC (Production live robots) perform processing that must update SAP using middle-ware server

Expertech



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Preparation of proposal for implementing offline sales order processing and time-tracking for field service order technicians. Information captured using hand held devices is used to update SAP.

Novus (Puerto Rico)

Preparation of proposal and proof of concept (POC) for data exchange between Point of Sale (POS) and SAP using EDI (XML and IDocs).

MSA (Mine Safety Associates)

Implementation and configuration of Report Distributor (SAP Bolt On product from DataMirror)

Tennant Corporation

Preparation of proposal and proof of concept (POC) for implementing offline sales order processing by field service order representatives. Information captured using hand held devices is used to update SAP.

CBC

Preparation of proposal, proof of concept (POC), and project plan for implementing physical auditing of assets based on data extracted from and (subsequent to approval) upload to SAP

Dare Foods

Preparation of proposal, and proof of concept for implementing offline sales order processing using Windows CE-based Pocket PC devices transmitting data over a 1X-based WAN. Information captured using hand held devices is used to update SAP.



Government of Canada – R.C.M.P. Automated Information Systems
October 2004 - December 2004

Development of a PDA-based goods receipt and distribution module to bolt onto the material management system developed in 2001 for the [United Nations Peacekeeping Directorate](#) and migrated to [hand-held / bar-coded environment](#) in 2002. The module would allow procurement data extracted from the TEAM (SAP) system to be used to perform goods receipt and delivery to end users using hand-held devices. The resulting data (delivery and tracking information) is to be used to populate a middle layer Oracle 8i database, and ultimately update TEAM (SAP) as the back-end ERP. This builds on previously developed functionality implemented for the R.C.M.P. UN Peacekeeping:

1. Performs needs analysis and scoping exercise
2. Recommend optimal hardware and infrastructure that best meets business requirements
3. Develop application to transfer data from Oracle 8i RDBMS to Palm-based barcode reading hardware.
4. Develop Palm application to enable barcode capable warehouse operations: goods issue, returns, exchanges, and stock audit
5. Implement barcode-printing capability
6. Design screens for data capture on Symbol SPT-1700
7. Develop the application to read the captured data and update the Oracle 8i backend RDBMS.
8. Master Data Load

Government of Canada – R.C.M.P. Automated Information Management Systems
October 2004 - April 2005

Development of material management application to manage issues and tracking of classified telecommunications equipment in a bar-coded environment

1. Performs needs analysis and scoping exercise
2. Recommend optimal hardware and infrastructure that best meets business requirements
3. Develop application to transfer data from Oracle 8i RDBMS to Palm-based barcode reading hardware.
4. Develop Palm application to enable barcode capable warehouse operations: goods issue, returns, exchanges, and stock audit
5. Implement barcode-printing capability
6. Design screens for data capture on Palm Tungsten C
7. Develop the application to read the captured data and update the Oracle 8i backend RDBMS.
8. Master Data Load



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Government of Canada – R.C.M.P. Protective Policing Logistics
February 2005 - April 2005

Master Data Load: Conversion and migration of data from current material management system (Basset Pro) to new material issue and tracking system.

1. Analysis and configuration of warehouse layout
2. Creation of application to generate bar-coded location labels
3. Analysis and data mapping of serialized and bulk material (stocked)
4. Development of ETL tool to convert source (Basset Pro) data to stock tracking and issue system (Oracle 8i)

Government of Canada – R.C.M.P. Protective Policing Logistics
February 2005 - April 2005

Analysis for implementation of materiel management application developed in 2001 for the R.C.M.P. (see below) in two distinct infrastructures: Batch hand-held devices and wireless RF hand-held devices. The software is to be configured according to specific needs and limitations of two separate warehouses. The project mainly involves enhancement, configuration and code migration to a wireless platform.

This project is expected to allow the R.C.M.P. to use one common material management solution to stock, issue and track materiel in either desktop, hand-held batch or hand-held RF flavors. Scope of recommendations include:

1. Performs needs analysis and scoping exercise
2. Recommend optimal hardware and infrastructure that best meets business requirements
3. Migrate current application from SQLBase 6.1 to Oracle 8i RDBMS and alter relevant code sections
4. Addition of configurable options for use among different warehouses without re-coding
5. Master Data Load

IDÉGÉ - Arinso International Pedagogical Consulting for Jacob Inc.
August – October 2004

IBC Project (Purchase Order Automation)

Pedagogical consulting and for Jacob clothes line (fashion industry). Since their Go-Live in 2001 (see previous project below) Jacob has decided to extend the procurement process to it's employees and allow them to use SAP R/3 to procure goods and services for internal



consumption (rather than resale items only). Key employees are tasked with all phases of the process:

1. Master Data (vendor, article, service master records)
2. Purchase Requisitions
3. Purchase Orders
4. Goods Receipts
5. Invoice Settlements (including pre-payments)

SAP Workflow integrated with Lotus Notes resulted in a drastic change for the employee who formerly relied on other divisions to perform the tasks.

Develop documentation and training material to facilitate knowledge transfer of over 60 SAP R/3 transactions to employees using SAP R/3 Version 4.6C – Retail. The material developed (both high level concepts as well as step-by-step procedures) consisted of :

1. PowerPoint Presentations
2. Documented Step-By-Step Procedures
3. Quick Help Tools
4. Tutorials
5. Some multi-media based knowledge transfer
6. Training exercises

Government of Canada – Royal Canadian Mounted Police International Peacekeeping Operations October 2002 - December 2002

Development and deployment of multimedia computer-based training (CBT), reference and knowledge transfer material for material and warehouse management system.

Government of Canada – Canadian Space Agency January 2002 - April 2002

SAP-AMMIS Interface Development.

AMMIS has been selected as the Material Management system of choice to ensure day-to-day operations. Since SAP is the Agency's Corporate ERP system, this means maintaining two systems simultaneously:

- AMMIS - the tool to ensure day to day operations of the Inventory Control, Customs and Excise Unit and its clients
- SAP - The corporate ERP system used primarily for data warehousing and reporting purposes (insofar as material management is concerned).



In addition to initial legacy data loads, data exchange will be required between the two systems on an ongoing basis.

- SAP-AMMIS Interface development:
 - Asset Management:
 - A. Legacy Master Data Load: Generation of Excel spreadsheets for AMMIS initial data load
 - B. SAP Extract of Asset Procurement Data for AMMIS
 - C. SAP Asset Custodial Updates: SAP updates from AMMIS extract of asset custodial records (including initial and subsequent assignments)
 - D. SAP Asset Value Adjustments: SAP updates from AMMIS extract of asset data subsequent to value adjustments
 - Receiving
 - A. SAP Extract of Procurement Data for Receiving
 - B. SAP Receiving: SAP updates from AMMIS Extract of Receiving Data (subsequent to receiving in AMMIS)
 - Warehouse Management
 - A. Master Data Load
 - Development of Material Tracking Module

Government of Canada – Environment Canada
November 2001 - April 2002

Elaboration of a material management strategy to be implemented to ensure material management systems are in harmony with the Treasury Board of Canada's new Financial Information Strategy for Federal Departments. The project is broken down into three major phases:

- Assessment of current needs Analysis of Oracle Financials and the gaps that exist to perform material management functionality according to the specific needs of Environment Canada
- Identification of Driving Factors Identification of highlights and principal factors to consider in the elaboration of a strategy that would allow front-line managers to manage the assets and inventory under their responsibility while ensuring Treasury Board Policies and Environment Canada Directives are respected.
- Development of the Material Management Strategy

IDÉGÉ - Arinso International: Pedagogical Consulting for Connexim Inc.
December 2001 – Feb 2002

Knowledge Transfer Presentation – MM and SD Concepts in SAP Overview presentation of Material Management and Sales and Distribution modules in SAP. The objective is to offer the client a view of the possibilities and potential pit-falls in new SAP installations, and elaborate best business practices that meet the client's business process flows.



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Government of Canada – R.C.M.P. United Nations Peacekeeping Directorate.
December 2001 - January 2002

Migration of material management functionality (stock issues and audits) to bar-code reading platform

- Recommend optimal hardware that meets business requirements
- Develop application to transfer data from SQL-based relational database management system to Palm-based barcode reading hardware.
- Develop Palm application to enable barcode capable warehouse operations: goods issue, returns, exchanges, and stock audit
- Implement barcode-printing capability
- Design screens for data capture on Symbol SPT-1700
- Develop the application to read the captured data and update the SQL-based relational database management system.

Government of Canada – Canadian Space Agency
October - November 2001

Analysis and Evaluation of Material Management Systems. The mandate consisted of four main phases:

1. Perform an in-depth analysis of business process review and identify shortcomings between adopted best business practices and material management systems currently used to perform Inventory Control, Shipping and Receiving, Customs and Excise, Warehousing, Material Tracking and Hazardous Materials Management functions.
2. Generate a functional as well as technical checklist to evaluate the above material management systems as well as future systems being considered.
3. Use the generated lists to evaluate the effectiveness and efficiency of SAP's R/3 system (as it is currently configured) and AMMIS as a possible alternative for some of the systems in place.
4. Supply recommendations and estimates of development efforts required for implementing the systems such that the client's business practices are met.

IDÉGÉ - Arinso International - August – October 2001

SAP 4.6C Retail Pedagogical Consulting for Jacob Inc.

Pedagogical consulting and end-user (pre and post Go-Live) support for Jacob clothes line (fashion industry). Develop documentation and training material to facilitate knowledge transfer to employees using SAP R/3 Version 4.6C – Retail system and Business Information Warehouse.



The material developed (both high level concepts as well as step-by-step procedures) pertains mainly to allocation planning in SAP Retail and consists of:

- PowerPoint Presentations
- Documented Procedures
- Quick Help Tools
- Tutorials
- User Training (classes of 12 participants, train the trainer, peer-to-peer)
- Development of training exercises

Government of Canada – R.C.M.P. Material Management Directorate
September 2001

Feasibility study and options analysis for implementing radio-frequency, bar-coded access to SAP-R3 using Intermec and Janus (DOS-Based) hand-held devices in a warehouse environment (SAP WM / SD / MM). Identification of alternative technologies to maximize return on investment (hardware and software).

Government of Canada – R.C.M.P. United Nations Peacekeeping Directorate.
July 2001

Master Data Load for automated inventory control system.

- Analysis and mapping of legacy data
- Data extraction from legacy system
- Development of program to load extracted data

Government of Canada – R.C.M.P. United Nations Peacekeeping Directorate.
May - June 2001

Analysis for and development of automated inventory control system.

- Analysis of business process review and infrastructure requirements
- Analysis of current market trends and aligning development proposal with Treasury Board Directives and Guidelines.
- Preparation for project plan for client review and approval (including flowcharts, proof of concepts and prototyping).
- Development and installation of SQL Relational Database Management System (RDBMS).
- Object-Oriented Programming of approved functionality (based on project specification proposal).
- Quality assurance testing, documentation (both user and technical), and end-user training.



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Pièces Métropolitaines **March - June 2001**

Development of Material Management and POS Solution

Development of full-scale material management system. The project consisted of automating the entire material life cycle process (acquisition, processing, warehousing, sales, inventory control, stock replenishment and management reporting from scratch).

- Business process review and needs analysis
- Hardware and software recommendations and acquisition
- Installation of RDBMS and creation of tables, stored commands and procedures.
- Development of object-oriented coding to execute the desired functionality (including user-interfaces, auto backup and restores, and file-based EDI for updating inventory master records from suppliers).
- Quality assurance testing, documentation, end-user training and post-implementation support.