A PPML/T Variable-Data-Printing Solution

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Abstract

HP has developed a highly customizable end-to-end solution for the retail industry that integrates the production cycles with the business management systems, facilitating campaign management and automating production of high impact graphical customized Point Of Purchase materials. The solution uses state of the art variable data printing technology (PPML/T) to produce high volumes of uniquely composed full color in-store communication materials.

Retailers can centrally define and design the materials. The solution will then automatically produce customized documents for each particular store, taking into account its own promotions, price zone, inventory, language, etc. The materials are transmitted, composed and produced on-demand by a distributed network of Print Stations connected to the system. Print Stations can be deployed in the store, some corporate Print Center or even in outsourced Print Service Provider facilities.

Introduction

HP realized lack of integration, automation & flexibility in existing solutions was preventing the Retail market to take advantage of digital publishing technology.

Retail's digital publishing solution market is highly fragmented. Most solutions in this space are either centered on the store or on the headquarters, either centralized or distributed, but never both. The market is dominated by small companies that provide limited solutions, incapable of effectively integrating with Retailer's business management systems to provide a truly end-to-end solution.

In late 2001 HP started investigation for an end-to-end Variable-Data-Printing solution for the Retail market. *Caprabo*, one of the major Spanish retailers, engaged in a pilot in July 2002. The project, codenamed Rainbow, was a joint effort of HP Consulting, Marketing & R&D.

Value Proposition

Through improved and more appealing in-store communication created by retailers for manufacturers, the solution increases sales and provides a new profit center without increasing retailer sales space. Retailers can now rent their in-store space to display Manufacturers' high visual communications, yet fully preserving their corporate image. In return, Manufacturers now can bring advertising messages directly to the retail floor, where 70% of the purchase decisions are made.
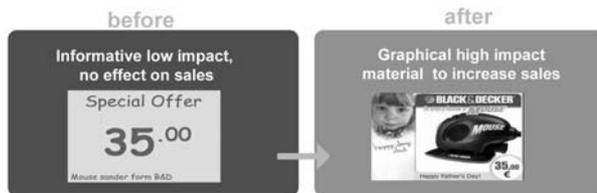

Figure 1. Improved in-store communication

Differentiators

Rainbow provides end-to-end integration of the production cycles with the business management systems, facilitating campaign management and automating production of full color in-store communication materials (also known as Point Of Purchase or POP).

POP materials are centrally defined at the Retailer's Headquarters. However, Rainbow will automatically produce POP documents customized for each particular store, each with its own promotion settings, prices, inventory, language, etc. The documents are electronically distributed and produced on a wide range of geographically distributed Digital Publishing Devices.

Overall, the solution offers unprecedented levels of integration, flexibility and automation, supporting production from small to large sizes, from short runs to large quantities, from centralized to distributed production, from in-house to outsourced facilities.

Unlike previous solutions, pre-printed media or multi-pass printing is NOT required. Backgrounds, images and text are merged dynamically and printed on plain paper in one single step. This approach minimizes preparation time, eliminates media stocking issues and enables production of rich, high impact POP materials.

Technical Aspects

The Rainbow solution deploys inside the Retailer's enterprise network. The solution can operate as a standalone system, but the main advantage is that it easily integrates with Retailer's business management systems.

Rainbow will interface with the Retailer's Enterprise Resource Planning System (ERP). This is the system that manages the information about products, inventory, prices and promotions. Rainbow will also interface with the Retailer's Digital Asset Management System (DAM), if available. This system manages digital assets, normally product images and other POP documents.

XML based interfaces are used for integration with modern enterprise systems. Alternatively, easy to build "bridges" may be used to link with legacy systems not designed for XML inter-operability. The "bridge" paradigm simplifies the integration efforts, shielding the rest of the application from system dependencies.

The solution uses the information coming from the ERP and the DAM subsystems to generate specific POP materials addressed to each Retailer's store. Each store can potentially require materials with different prices, different products, different language, different layout, etc. The ERP system provides the store details that the solution uses to customize POP materials for each store.

The solution sorts the POP materials and assembles them into imposed, multi-page, variable data printing jobs.

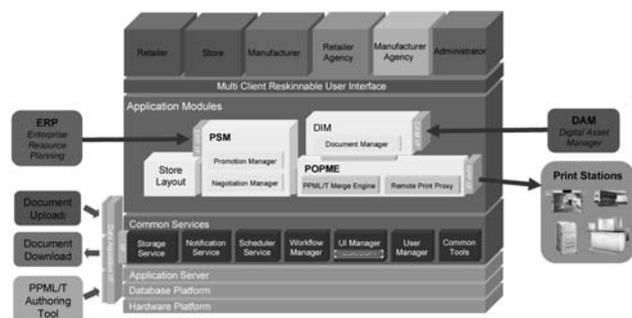Jobs are then submitted for fulfillment to Print Stations.

Figure 2. Rainbow Architecture Overview

The Print Stations drive clusters of Digital Publishing devices to efficiently produce variable data printing materials using all available print hardware acceleration.

Print Stations use deferred variable data printing and massive asset caching to greatly optimize bandwidth. Intelligent auto-rotation and imposition/nesting is used to optimize printing and save paper.

Print Stations use encrypted communications and a pull mode transport protocol to communicate across firewalls. The benefit is that PS may be deployed anywhere: in the Stores, in corporate Print Centers or even outside the enterprise network, in outsourced Print Service Providers.

The Print Station "network" can be arranged to fit Retailer's specific requirements to balance outsource vs. in-house, distribute-and-print vs. print-and-distribute, etc.

PPML Templating technology (aka PPML/T) is used end-to-end throughout the solution pipeline, from template authoring to job imposition to final document rendering. PPML/T is an official standard from PODi, a consortium of the digital printing industry, that was created to promote variable data printing applications.

Designers may use the application of their choice to create the basic design of the variable templates used by the solution. They export to PDF and then generate the PPML/T template by means of a proprietary Acrobat Plug-in developed by HP. The plug-in sports assisted visual mark-up and automatic static-to-variable object conversions, greatly simplifying the authoring process.

A standalone PPML/T preflight tool is also provided as part of the Rainbow PPML/T Authoring Tool package.

The key benefits PPML/T brings to the solution are simplicity, flexibility, inter-operability and performance. Using a standard endorsed by the digital printing industry such as PPML/T will improve solution's inter-operability.

PPML Templating is a complimentary functional specification based on PPML, with XSLT scripting capabilities. Both are well known standards, this greatly reduces the learning curve, and facilitates proliferation of third party printing solutions.

PPML/T is also powerful enough to represent complex variable data printing templates and scripted data flows.

For instance, during the PPML/T rendering, font size is automatically reduced to fit variable text inside template fields, avoiding traditional VDP issues with clipped and out-of-bounds text. Variable images (PDF/JPEG) are also scaled to fit the variable area by a number of options.

Moreover, fitting algorithms are XSLT scripts that can be customized any time, without code changes.

The Caprabo Pilot

The HP-Caprabo agreement was officially signed in July 2002. Deployment in production used an evolutionary approach, and ranged from December 2002 to April 2003.

Today Rainbow drives the production of all POP materials required in more than 500 Caprabo stores. The solution properly manages different product lists, price zones, languages and inventories for each store.

Caprabo's Rainbow currently drives production of well over 1000 promotions per month per store. Besides promotional material, Rainbow also drives production of informative/generic in-store materials (ie: area banners).

The Caprabo Print Station network prints >500,000 A6 documents per month, but condensed in just 4-5 days. Volumes are expected to increase as Caprabo grows the number and size of stores it currently controls.

Caprabo opted for centralized mass production in 3 Print Service Providers, but with moderate in-house production infrastructure in headquarters and some in bigger stores, being this targeted mainly for urgent and special jobs.

Bandwidth requirements for the solution are 32Kbps for store connection and 128Kbps for connection with PSPs.

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Biography

Luca Chiarabini is a Senior Technical Leader within Hewlett-Packard's Digital Publishing Solutions Division. With over 10 year professional experience in the solutions and software development industry, he is involved in the technical direction of the Solutions and Services group of Hewlett-Packard Barcelona. Computer Science B.S. from Universitat Politécnica de Catalunya in 1994, and currently pursuing a Software PhD degree with the same university.