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(54) METHOD AND SYSTEM FOR MERGING VARIABLE TEXT AND IMAGES INTO BITMAPS DEFINED BY A PAGE DESCRIPTION LANGUAGE

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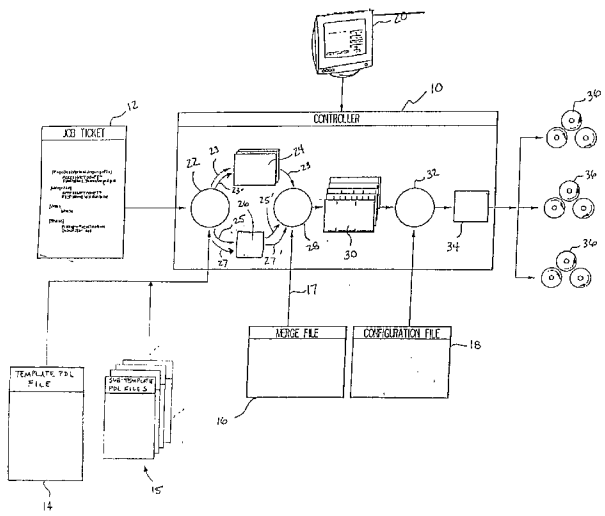
(57) **ABSTRACT**

A computer implemented method includes the steps of: a) generating a template PDL (page description language) specification, the template specification including template data and associated graphic attributes (i.e., graphic states) defining how the template data is to appear on a printed page, the template specification including at least one variable data identifier; b) generating a plurality of sub-template PDL specifications, each sub-template specification including sub-template data and associated graphic attributes defining how the sub-template data is to appear on a portion of a printed page; c) interpreting the template specification so as to generate a template bitmap or a plurality of template rendering commands (display list), and during the interpreting step, identifying the variable data identifier; d) saving the template bitmap or the plurality of template rendering commands into memory; e) associating the variable data identifier with the sub-template specifications; f) accessing a first sub-template specification from the plurality of sub-template specifications; g) processing the first sub-template specification so as to generate a sub-template bitmap or a plurality of first sub-template rendering commands; h) accessing a copy of the template bitmap or the plurality of template rendering commands from memory; i) merging the copy of the template bitmap or template rendering commands with the sub-template bitmap or sub-template rendering commands so as to provide a first merged bitmap or first merged plurality of rendering commands; j) generating a first merged bitmap from the first merged plurality rendering commands (if necessary); k) accessing a next sub-template specification from the plurality of sub-template specifications; l) processing the next sub-template specification so as to generate a next sub-template bitmap or plurality of next sub-template rendering commands, m) accessing a copy of the template bitmap or template rendering commands from memory; n) merging the copy of the template bitmap or template rendering commands with the next sub-template bitmap or sub-template rendering commands so as to provide a next merged bitmap or next plurality of rendering commands; and o) generating a next merge bitmap from the next merged plurality of rendering commands, if necessary. The steps k-o may be repeated, as necessary, to generate a plurality of merged bitmaps.



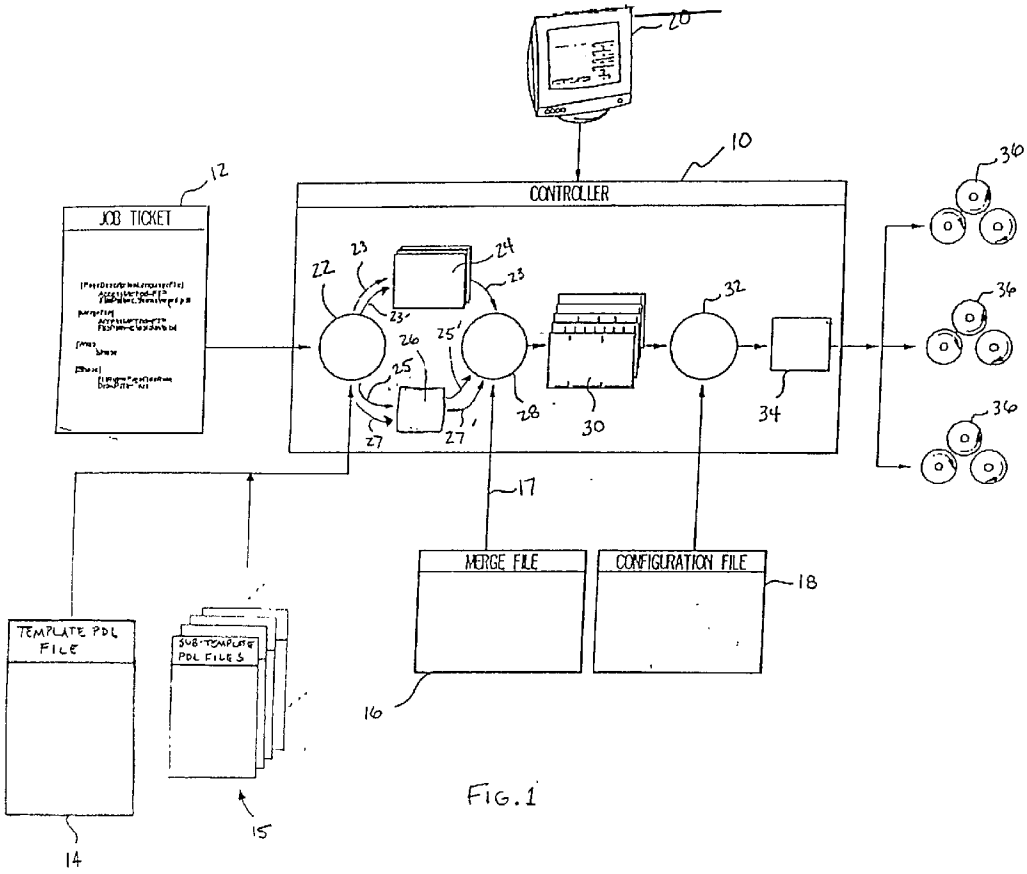

20
10
12
JOB TICKET
CONTROLLER
22
23
24
23'
25
26
25'
27
27'
28
30
32
34
36
36
36
17
MERGE FILE
CONFIGURATION FILE
18
16
TEMPLATE PDL FILE
SUB-TEMPLATE PDL FILES
14
15

FIG. 1

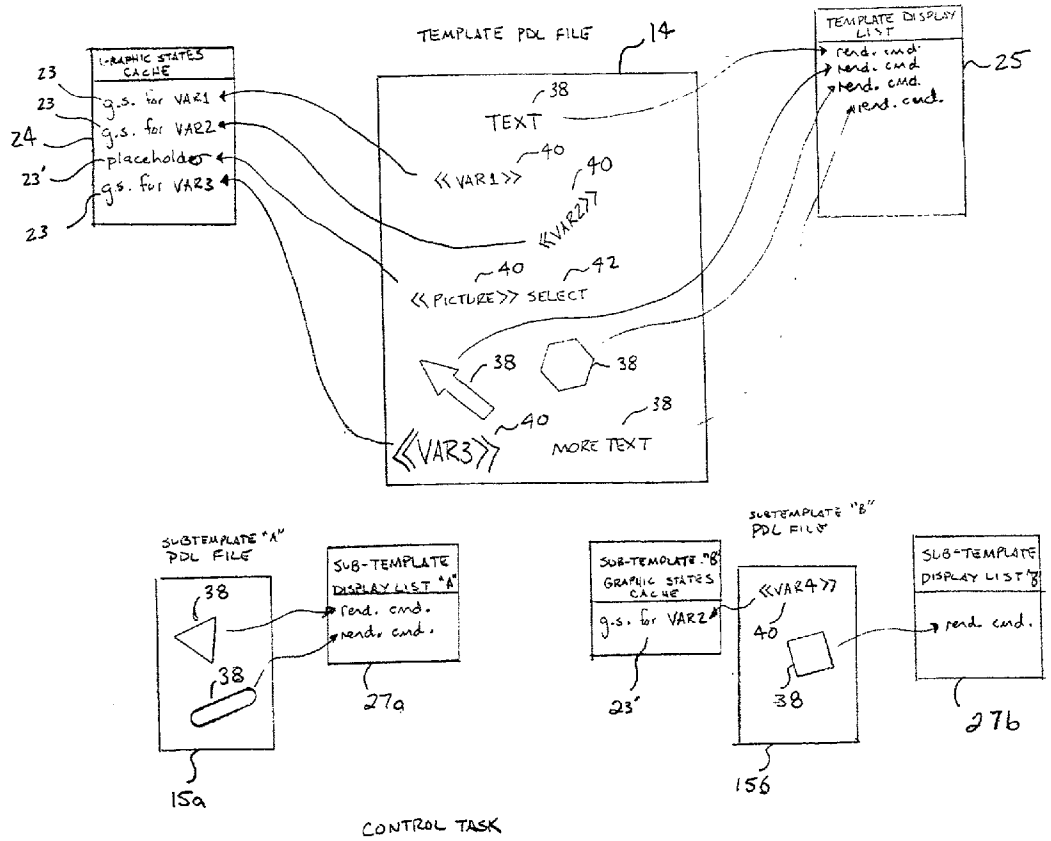
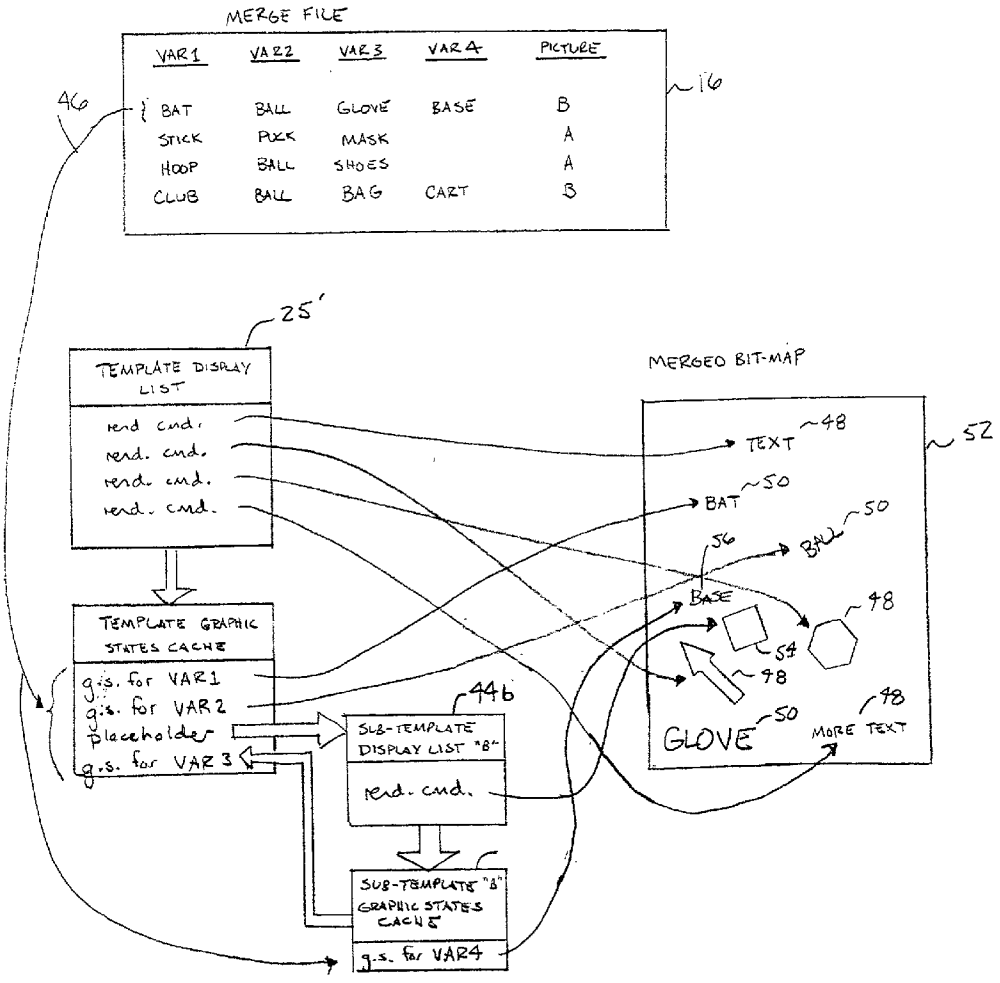

GRAPHIC STATES CACHE
g.s. for VAR1
g.s. for VAR2
placeholder
g.s. for VAR3
23
23
24
23'
23
TEMPLATE PDL FILE
14
38
TEXT
40
«VAR1»
40
«VAR2»
40
42
«PICTURE» SELECT
38
38
40
38
«VAR3»
MORE TEXT
TEMPLATE DISPLAY LIST
rend. cmd.
rend. cmd.
rend. cmd.
rend. cmd.
25
SUBTEMPLATE "A" PDL FILE
38
38
SUB-TEMPLATE DISPLAY LIST "A"
rend. cmd.
rend. cmd.
27a
15a
SUB-TEMPLATE "B" GRAPHIC STATES CACHE
g.s. for VAR2
23'
SUBTEMPLATE "B" PDL FILE
«VAR4»
40
38
15b
SUB-TEMPLATE DISPLAY LIST "B"
rend. cmd.
27b
CONTROL TASK

FIG. 2



MERGE TASK

FIG. 3

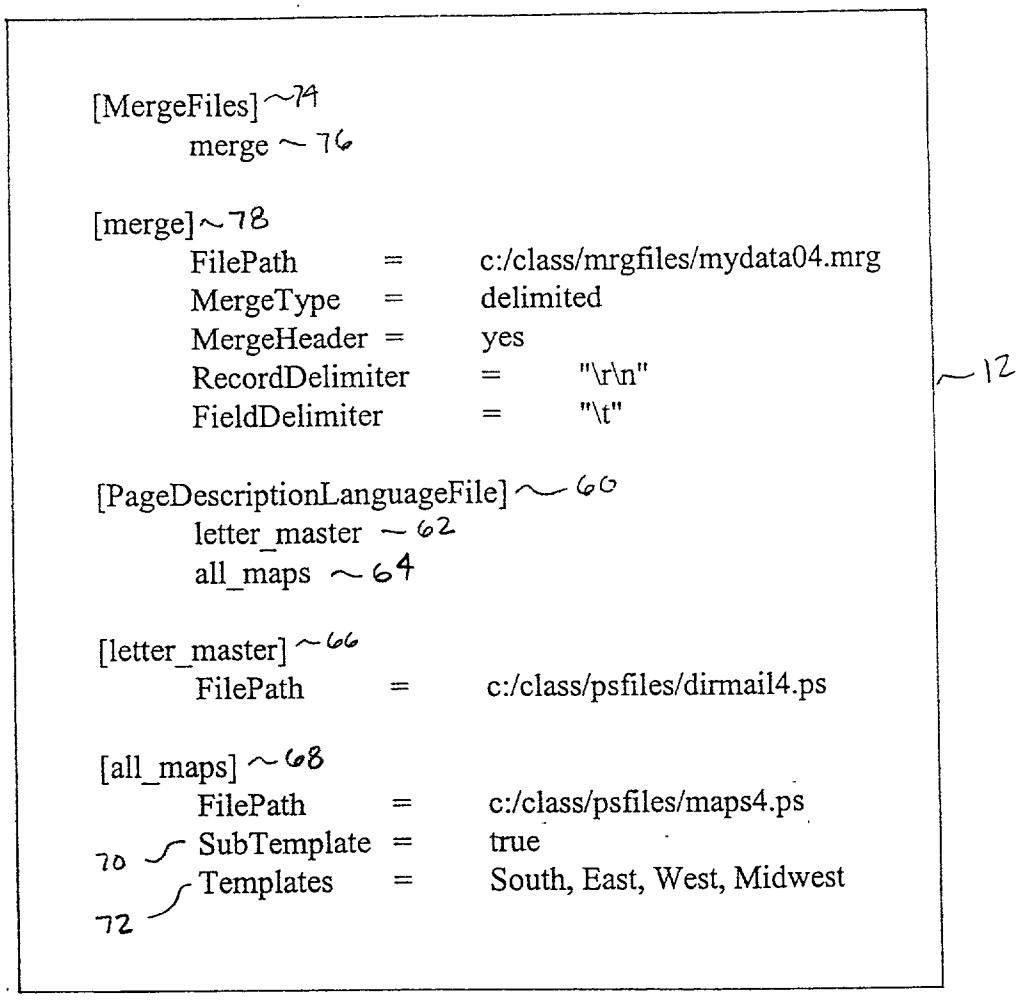
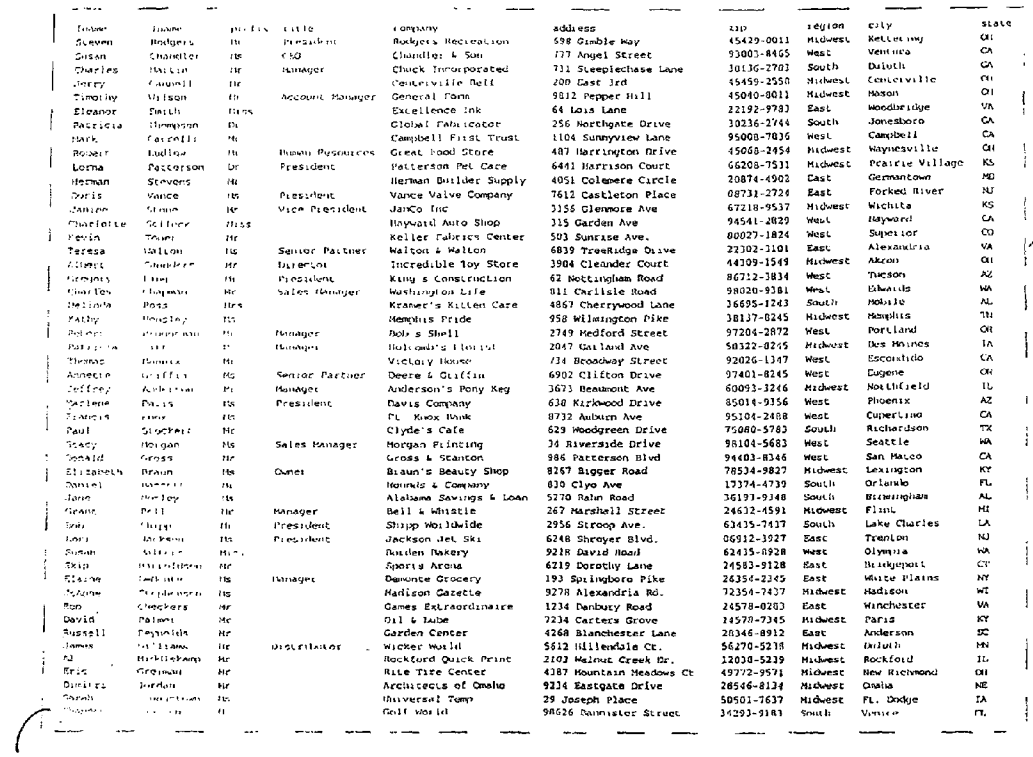

[MergeFiles] ~74
merge ~ 76
[merge] ~78
FilePath = c:/class/mrgfiles/mydata04.mrg
MergeType = delimited
MergeHeader = yes
RecordDelimiter = "\r\n"
FieldDelimiter = "\t"
~12
[PageDescriptionLanguageFile] ~ 60
letter_master ~ 62
all_maps ~ 64
[letter_master] ~ 66
FilePath = c:/class/psfiles/dirmail4.ps
[all_maps] ~ 68
FilePath = c:/class/psfiles/maps4.ps
70 SubTemplate = true
72 Templates = South, East, West, Midwest

FIG. 4



[illegible]	[illegible]	[illegible]	title	company	address	zip	region	city	state
Steven	Rodgers	Mr	President	Rodgers Recreation	698 Gimble Way	45429-0011	Midwest	Kettering	OH
Susan	Chandler	Ms	CEO	Chandler & Son	777 Angel Street	93003-8465	West	Ventura	CA
Charles	Mallin	Mr	Manager	Chuck Incorporated	731 Steeplechase Lane	30136-2703	South	Duluth	GA
Jerry	Caudill	Mr		Centerville Dept	200 East 3rd	45459-2550	Midwest	Centerville	OH
Timothy	Wilson	Mr	Account Manager	General Farm	9812 Pepper Hill	45040-8011	Midwest	Mason	OH
Eleanor	Smith	Miss		Excellence Ink	64 Lois Lane	22192-9783	East	Woodbridge	VA
Patricia	Thompson	Ms		Global Fabricator	256 Northgate Drive	30236-2744	South	Jonesboro	GA
Mark	Farrell	Mr		Campbell First Trust	1104 Sunnyview Lane	95008-7036	West	Campbell	CA
Robert	Ludlow	Mr	Human Resources	Great Food Store	487 Harrington Drive	45068-2454	Midwest	Waynesville	OH
Lorna	Patterson	Dr	President	Patterson Pet Care	6441 Harrison Court	66208-7531	Midwest	Prairie Village	KS
Herman	Stevens	Mr		Herman Builder Supply	4051 Colemere Circle	20874-4902	East	Germantown	MD
Doris	Vance	Ms	President	Vance Valve Company	7612 Castleton Place	08731-2724	East	Forked River	NJ
Janice	Grant	Mr	Vice President	JanCo Inc	3156 Glenmore Ave	67218-9537	Midwest	Wichita	KS
Charlotte	Sellner	Miss		Hayward Auto Shop	315 Garden Ave	94541-2829	West	Hayward	CA
Kevin	Town	Mr		Keller Fabrics Center	503 Sunrise Ave.	80027-1824	West	Superior	CO
Teresa	Walton	Ms	Senior Partner	Walton & Walton	6839 TreeRidge Drive	22302-3101	East	Alexandria	VA
Albert	Chandler	Mr	Director	Incredible Toy Store	3904 Cleander Court	44309-1549	Midwest	Akron	OH
Clemens	Tiel	Mr	President	King s Construction	62 Nottingham Road	86712-3834	West	Tucson	AZ
Charles	Chapman	Mr	Sales Manager	Washington Life	811 Carlisle Road	98020-9381	West	Edmonds	WA
Melinda	Ross	Mrs		Kramer's Kitten Care	4867 Cherrywood Lane	36695-1243	South	Mobile	AL
Kathy	Douglas	Ms		Memphis Pride	958 Wilmington Pike	38137-8245	Midwest	Memphis	TN
Peter	Hamilton	Mr	Manager	Bob s Shell	2749 Medford Street	97204-2872	West	Portland	OR
Patricia	Hill	Dr	Manager	Holcomb's Florist	2047 Garland Ave	50322-8245	Midwest	Des Moines	IA
Thomas	Bowers	Mr		Victory House	734 Broadway Street	92026-1347	West	Escondido	CA
Annette	Griffin	Ms	Senior Partner	Deere & Griffin	6902 Clifton Drive	97401-8245	West	Eugene	OR
Jeffrey	Anderson	Mr	Manager	Anderson's Pony Keg	3673 Beaumont Ave	60093-3246	Midwest	Northfield	IL
Marlene	Davis	Ms	President	Davis Company	630 Kirkwood Drive	85014-9356	West	Phoenix	AZ
Francis	Knox	Mr		Ft. Knox Bank	8732 Auburn Ave	95104-2488	West	Cupertino	CA
Paul	Stockett	Mr		Clyde's Cafe	629 Woodgreen Drive	75080-5783	South	Richardson	TX
Tracy	Morgan	Ms	Sales Manager	Morgan Printing	34 Riverside Drive	98104-5683	West	Seattle	WA
Donald	Gross	Mr		Gross & Stanton	986 Patterson Blvd	94403-8346	West	San Mateo	CA
Elizabeth	Braun	Ms	Owner	Braun's Beauty Shop	8267 Bigger Road	78534-9827	Midwest	Lexington	KY
Daniel	Hermann	Mr		Hornung & Company	830 Clyo Ave	17374-4739	South	Orlando	FL
Jane	Dudley	Ms		Alabama Savings & Loan	5270 Rahn Road	36191-9348	South	Birmingham	AL
Grant	Bell	Mr	Manager	Bell & Whistle	267 Marshall Street	24612-4591	Midwest	Flint	MI
Bob	Clapp	Mr	President	Shipp Worldwide	2956 Stroop Ave.	63435-7417	South	Lake Charles	LA
Jack	Jackson	Ms	President	Jackson Jet Ski	6248 Shroyer Blvd.	06912-3927	East	Trenton	NJ
Susan	Gillis	Mrs		Borden Bakery	9218 David Road	62435-8928	West	Olympia	WA
Skip	Christensen	Mr		Sports Arena	6219 Dorothy Lane	24583-9128	East	Bridgeport	CT
Elaine	Lehman	Ms	Manager	Demonte Grocery	193 Springboro Pike	26354-2345	East	White Plains	NY
Jayne	Stephenson	Ms		Madison Gazette	9278 Alexandria Rd.	72354-7437	Midwest	Madison	WI
Ron	Checkers	Mr		Games Extraordinaire	1234 Danbury Road	24578-0283	East	Winchester	VA
David	Palmer	Mr		Oil & Lube	7234 Carters Grove	24578-7345	Midwest	Paris	KY
Russell	Reynolds	Mr		Garden Center	4268 Blanchester Lane	28346-8912	East	Anderson	SC
James	Williams	Mr	Distributor	Wicker World	5612 Hillendale Ct.	56270-5218	Midwest	Duluth	MN
Al	Hirshkowitz	Mr		Rockford Quick Print	2103 Walnut Creek Dr.	12038-5239	Midwest	Rockford	IL
Eric	Grosman	Mr		Rite Tire Center	4387 Mountain Meadows Ct	49772-9571	Midwest	New Richmond	OH
Dimitri	Jordan	Mr		Architects of Omaha	9234 Eastgate Drive	28546-8134	Midwest	Omaha	NE
Sarah	Hamilton	Ms		Universal Temp	29 Joseph Place	50501-7637	Midwest	Ft. Dodge	IA
Thomas	Martin	Mr		Golf World	98626 Bannister Street	34293-9183	South	Venice	FL

86

16

FIG. 5

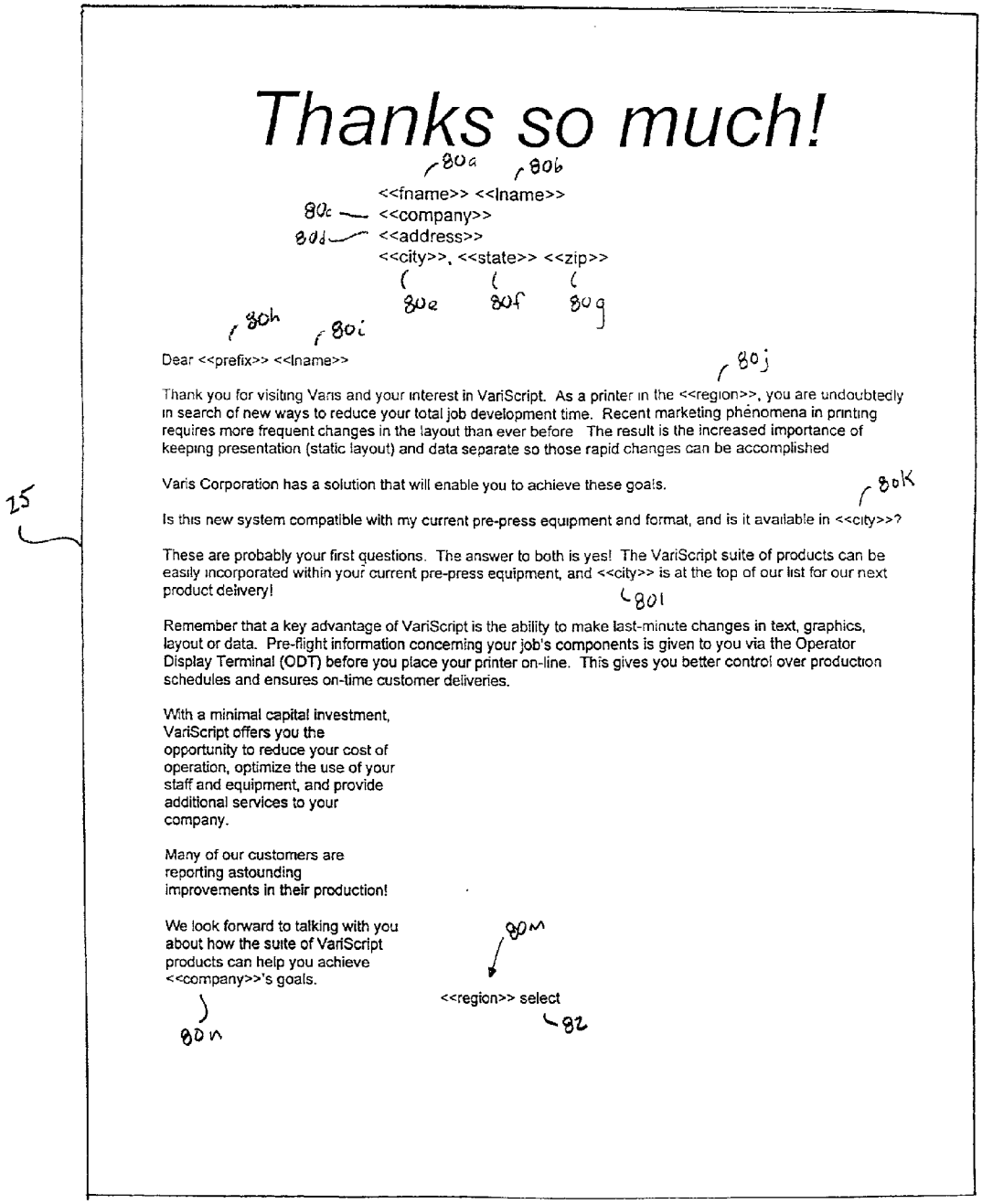

Thanks so much!
80a
80b
<<fname>> <<lname>>
80c
<<company>>
80d
<<address>>
<<city>>, <<state>> <<zip>>
80e
80f
80g
80h
80i
Dear <<prefix>> <<lname>>
80j
Thank you for visiting Varis and your interest in VariScript. As a printer in the <<region>>, you are undoubtedly in search of new ways to reduce your total job development time. Recent marketing phenomena in printing requires more frequent changes in the layout than ever before The result is the increased importance of keeping presentation (static layout) and data separate so those rapid changes can be accomplished
Varis Corporation has a solution that will enable you to achieve these goals.
80K
Is this new system compatible with my current pre-press equipment and format, and is it available in <<city>>?
These are probably your first questions. The answer to both is yes! The VariScript suite of products can be easily incorporated within your current pre-press equipment, and <<city>> is at the top of our list for our next product delivery!
80l
Remember that a key advantage of VariScript is the ability to make last-minute changes in text, graphics, layout or data. Pre-flight information concerning your job's components is given to you via the Operator Display Terminal (ODT) before you place your printer on-line. This gives you better control over production schedules and ensures on-time customer deliveries.
With a minimal capital investment, VariScript offers you the opportunity to reduce your cost of operation, optimize the use of your staff and equipment, and provide additional services to your company.
Many of our customers are reporting astounding improvements in their production!
We look forward to talking with you about how the suite of VariScript products can help you achieve <<company>>'s goals.
80m
80n
<<region>> select
82
15

FIG. 6

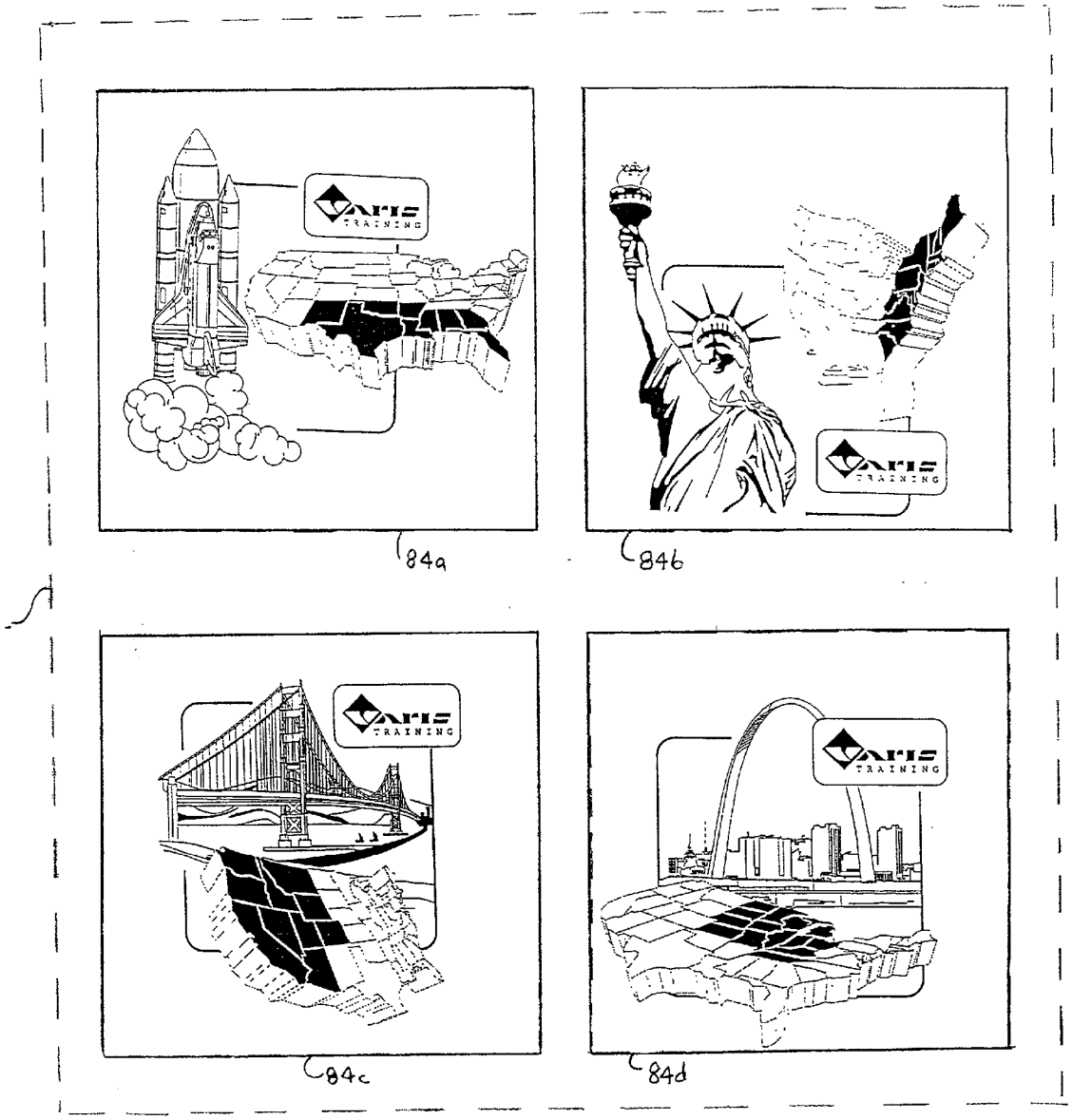


FIG. 7

Thanks so much!

88a 88b

88c Shannon Janszen
88d Golf World
98626 Bannister Street
Venice, FL 34293-9183

88e 88f 88g

88h 88i

Dear Ms Janszen

88j

Thank you for visiting Varis and your interest in VariScript As a printer in the South, you are undoubtedly in search of new ways to reduce your total job development time Recent marketing phenomena in printing requires more frequent changes in the layout than ever before. The result is the increased importance of keeping presentation (static layout) and data separate so those rapid changes can be accomplished.

Varis Corporation has a solution that will enable you to achieve these goals

88k

Is this new system compatible with my current pre-press equipment and format, and is it available in Venice?

These are probably your first questions. The answer to both is yes! The VariScript suite of products can be easily incorporated within your current pre-press equipment, and Venice is at the top of our list for our next product delivery!

88l

Remember that a key advantage of VariScript is the ability to make last-minute changes in text, graphics, layout or data. Pre-flight information concerning your job's components is given to you via the Operator Display Terminal (ODT) before you place your printer on-line. This gives you better control over production schedules and ensures on-time customer deliveries.

With a minimal capital investment, VariScript offers you the opportunity to reduce your cost of operation, optimize the use of your staff and equipment, and provide additional services to your company.

Many of our customers are reporting astounding improvements in their production!

We look forward to talking with you about how the suite of VariScript products can help you achieve Golf World's goals.

88n

88m

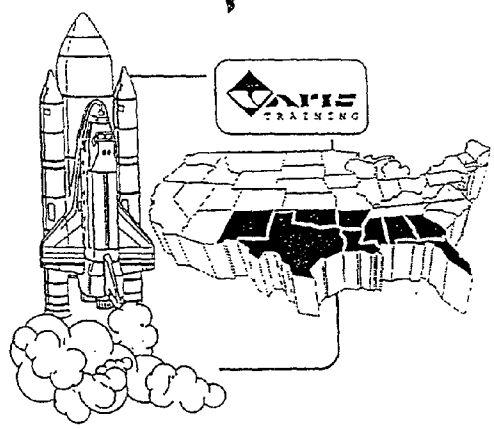


FIG. 8

METHOD AND SYSTEM FOR MERGING VARIABLE TEXT AND IMAGES INTO BITMAPS DEFINED BY A PAGE DESCRIPTION LANGUAGE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present patent application is a Continuation-In-Part of U.S. patent application Ser. No. 08/896,899, filed Jan. 18, 1997; which is a Continuation-In-Part of U.S. patent application Ser. No. 08/373,582, filed Jan. 18, 1995 and issued as U.S. Pat. No. 5,729,665.

BACKGROUND OF THE INVENTION

[0002] The present invention relates to the high-speed printing industry, and more particularly, to a system and method for merging variable data and images into a template image defined by a page description language file in a high speed printing environment.

[0003] Application programs, such as wordprocessors, illustrators, and computer aided design systems are software packages used to create a document (text and graphics) on a computer screen and to simultaneously generate a page description language ("PDL") specification, which is to be transferred to the printer, or to any other type of raster device or output device for creating a hard copy or copies of the document. Alternatively a PDL specification can be generated by a programmer without the assistance of an application program.

[0004] The printer executes the PDL specification to generate a bitmap of the document, or a raster-data representation of a document, and eventually transfers the bitmap or raster-data to a physical medium such as paper. A typical PDL language, such as PostScript (a registered trademark of Adobe Corporation) defines a page of the document as containing a number of data areas, where each data area contains either graphic or alpha-numeric data. Each data area is defined by a "graphic state," which is a collection of parameters or attributes for controlling the representation and appearance of text and graphics. For example, the graphic state can include a set of text attributes such as scale factor, type font, etc. In postscript an example of a PDL command used to build a graphic state can be:

[0005] 20 rotate/Times-Roman findfont 14 scalefont setfont

[0006] Examples of PDL commands used to define the graphic or alpha-numeric data that is displayed in the data area include:

[0007] 0 0 moveto and (ABC) show

[0008] The entire group of PDL commands used to define a document is hereinafter referred to as the "PDL specification." Furthermore, the entire graphic state, or any particular attribute or combination of attributes included in a graphic state, or any similar attribute contained in a PDL specification for defining or controlling the representation, location and/or appearance of text and graphics in a final bitmap or raster image is hereinafter referred to as "graphic attributes."

[0009] In variable data printing each printed document shares a common template and there is at least one area in the template that changes for each printing of the template. Typical PDL languages are not designed for high-speed variable data printing because, with PDL languages and interpreters, even if a single item of data in the document changes, an entirely new PDL specification must be created and interpreted. For example, if 100,000 copies of a mass mailing advertisement were to be printed (i.e., each copy of which is identical except for the mailing address) it is typically necessary to generate a new PDL specification for each copy to be printed. Hence, to generate 100,000 advertisements, it would be necessary to generate 100,000 PDL specifications, even though each advertisement is virtually the same except for the variable data area. The processing time required to interpret and render 100,000 PDL specifications is enormous, significantly slowing the entire printing system.

[0010] Furthermore, typical PDL languages do not include the capability of rapidly merging variable images or bitmaps (such as company logos, coupons, charts, and the like) along with variable text data into the template bitmaps. Accordingly, there is a need for a high-speed printing operation having the ability to merge variable data (which includes variable text data and bitmap images) into a template defined by a PDL specification.

SUMMARY OF THE INVENTION

[0011] It is an object of the present invention to provide as system and method for merging variable text and bitmap images into a PDL specification in high-speed printing operation. It is a further object of the present invention to provide the ability to generate a plurality of merged bitmaps, which are each essentially a copy of the template, except for at least one portion of the template into which the variable data has been merged. In this portion, each merged bitmap can contain a different set of variable data merged into it. The template is defined by a PDL specification, and this template specification only needs to be processed or interpreted once before creating all of the merged bitmaps, thus providing an extremely high-speed variable data printing operation. The variable images to be merged into the template may also be defined by "sub-template" PDL specifications, which also need only be processed or interpreted once. Such sub-template specifications may also allow for variable data or images to be merged into them as well, before being merged into the primary template.

[0012] A computer implemented method for merging variable data into an image defined by page description language specification ("PDL specification"), according to the present invention, generally comprises the steps of: processing (interpreting) the template PDL specification to produce a template; processing the sub-template specification (defining the variable bitmap image) to produce a sub-template; identifying a variable data identifier in the template specification; associating the sub-template with the variable data identifier; and merging the sub-template into a copy of a template to generate a merged bitmap.

[0013] More specifically, a computer implemented method of the present invention comprises the steps of: a) generating a template PDL specification, the template specification including template data and associated graphic attributes (i.e., graphic states) defining how the template data is to appear on a printed page, the template specification including at least one variable data identifier; b) generating

a plurality of sub-template PDL specifications, each sub-template specification including sub-template data and associated graphic attributes defining how the sub-template data is to appear on a portion of a printed page; c) interpreting the template specification so as to generate a template bitmap or a plurality of template rendering commands (display list), and during the interpreting step, identifying the variable data identifier; d) saving the template bitmap or the plurality of template rendering commands into memory; e) associating the variable data identifier with the sub-template specifications; f) accessing a first sub-template specification from the plurality of sub-template specifications; g) processing the first sub-template specification so as to generate a sub-template bitmap or a plurality of first sub-template rendering commands; h) accessing a copy of the template bitmap or the plurality of template rendering commands from memory; i) merging the copy of the template bitmap or template rendering commands with the sub-template bitmap or sub-template rendering commands so as to provide a first merged bitmap or first merged plurality of rendering commands; j) generating a first merged bitmap from the first merged plurality rendering commands (if necessary); k) accessing a next sub-template specification from the plurality of sub-template specifications; l) processing the next sub-template specification so as to generate a next sub-template bitmap or plurality of next sub-template rendering commands, m) accessing a copy of the template bitmap or template rendering commands from memory; n) merging the copy of the template bitmap or template rendering commands with the next sub-template bitmap or sub-template rendering commands so as to provide a next merged bitmap or next plurality of rendering commands; and o) generating a next merge bitmap from the next merged plurality of rendering commands, if necessary. The steps k-o may be repeated, as necessary, to generate a plurality of merged bitmaps.

[0014] The method of the present invention is accomplished by executing a control task in conjunction with a PDL interpreter program. The control task generates a template display list based upon the PDL commands in the PDL specification. The display list includes a plurality of rendering commands, where each rendering command designates a particular data area or object to be rendered, the graphic states to be applied to the data area and the offset address at which the rendered object, if any, in the data area is to be over written onto the final bitmap. The graphic states for each data area re set forth in the PDL specification, and pertain to the print attributes that describe how particular graphic or alpha-numeric data is to appear on the printed page. These attributes can include size, font, position, orientation, location and the like. The control task also generates display lists for each of the sub-template PDL specifications.

[0015] The control task, during the PDL interpretation procedures, monitors the data areas defined by the PDL specifications to watch for variable data identifiers defined by the PDL code. If the control task identifies a data area or object as being (or including) a variable data identifier, it reserves the graphic states associated with that variable data identifier in a cache and continues on with the interpretation procedure, preferably without adding the rendering commands for that variable data area into the display list. In this identification step, the control task will also watch for attributes associated with the variable data identifier. Such attributes may define the variable data identifier as identifying a sub-template bitmap, which is to be merged into the bitmap represented by the PDL specification. If the interpreter detects such an attribute, rather than saving off the graphic states associated with this variable data area, the control task will instead store a "place holder" in the graphic states cache corresponding to the sub-template PDL specification identified in the variable data identifier string. In certain embodiments of the invention, the control task may include certain graphic attributes associated with the variable data identifier in the cache, along with the place holder, such as a graphic attribute defining the location of the variable data identifier (which may be used to determine where to merge the sub-template bitmap into the template bitmap).

[0016] Once the interpreter program completes its interpretation of the PDL specifications, the control task saves each display list in memory without dispatching a bitmap of the template or sub-template to the printer. Subsequently, the merge task is initiated which accesses a copy of the template display list from memory and begins processing the rendering commands in the display list to create a bitmap of the template. Also, the merge task accesses a variable data record from a merge file; associates the variable data record to the graphic states in the cache and creates bitmaps for the data in the variable data record by applying the reserved graphics states to the data in the variable data record these bitmaps may be merged into the template bitmap or rendered directly onto the template bitmap during, before, or after the rendering of the template bitmap. When the merge task reaches the place holder in the cache associated with the sub-template display list, the merge task will access and begin processing the rendering commands in the sub-template display list to create a bitmap of the sub-template, which is then merged onto the template bitmap. When finished with the rendering commands of the sub-template display list, the merge task will return to the processing of the variable data record by applying the reserved graphic states thereto and merging the resulting bitmaps into the template bitmap. The merge task is repeated for each variable data record in the merge file to create a plurality of the merged bitmaps.

[0017] Therefore, the PDL specifications of the template and sub-templates need only be interpreted once, saving significant processing time for the variable printing operation, because the reserved graphic states may be utilized over and over again to create the variable bitmaps for each variable data record contained in the merge file. Similarly the display lists of the templates and sub-templates may be used over and over again to create the multiple merged bitmaps.

[0018] In its simplest form a sub-template is a collection of graphic states or graphic attributes taken from another source (such as a PDL specification) and used collectively as a variable element inserted into a template PDL page. The sub-templates may be used to add variable graphics/logos, or other static images to a page; to add formatted pieces (such as graphs, charts, images, etc.), including any number of additional variable fields to a page, a page of variable coupons directly marketed to the end receiver, and the like. The sub-template is really just another PDL page used as an element drawn somewhere on another page. For example, one coulde have a PDL page that had a company logo drawn on it. One could then use that logo on demand whenever a

printed page calls for it. Taken further, one could have several different logos, each drawn as a separate PDL page, which one could add (or not) to any page printed during the processing job.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] **FIG. 1** is a schematic, block diagram representation of a high-speed printing system according to the present invention;

[0020] **FIG. 2** is a schematic flow diagram illustrating the method of the control task according to the present invention;

[0021] **FIG. 3** is a schematic flow diagram representing the method of the merge task according to the present invention;

[0022] **FIG. 4** is an example of a job ticket file for use with the present invention;

[0023] **FIG. 5** is an example of a merge file for use with the present invention;

[0024] **FIG. 6** is an example of a sub-template file for use with the present invention.

[0025] **FIG. 7** is an example of a template file for use with the present invention; and

[0026] **FIG. 8** is an example of a merged page created by the process of the present invention using the PDL specification of **FIG. 7**, the job ticket of **FIG. 4**, the sub-template specifications of **FIG. 6** and the merge file of **FIG. 5**.

DETAILED DESCRIPTION

[0027] As shown in **FIG. 1, a** system for performing the method of the present invention includes a printer controller **10** having access to a job ticket file **12** a page description language ("PDL") file of a template **14**, a plurality of PDL files for sub-templates **15**, a source of variable data such as a merge file **16** and an optional printer configuration file **18**. The system also contains an operator control terminal **20** for providing operator controls such as indicating the name and path of the job ticket file **12** for the specific print job.

[0028] The job ticket file **12** contains the guidelines for the print job which can include the names and locations of the PDL files **14, 15**, the merge files **16**, the configuration files **18**, etc.; and may also include special instructions pertaining to the print job such as identifying and locating sub-templates, defining additional graphical attributes for variable data areas identified during the process, and the like, all of which is described in greater detail below. The PDL files **14, 15** are preferably PostScript® specifications created by an application program such as a wordprocessor, illustrator, or computer aided design system. The merge file **16** contains platform independent data, such as text data, image data, bar-code data and the like, which is to merged into a template bitmap defined by the PDL template specification **14** or the PDL sub-template specifications **15** during the merging task, as will be described in detail below. The configuration file **18**, defines the print engines and the post processing equipment and other options to be executed.

[0029] Initially, the path and name of the job ticket file **12** is specified by the operator using the operator control terminal **20**. The printer controller **10** retrieves the job ticket file **12** and then retrieves the PDL files **14, 15** specified in the job ticket file. Next, the controller **10** initiates a control task **22** in conjunction with a page description language interpreter program.

[0030] The control task **22** interprets the PDL specifications from the PDL files **14, 15** and monitors data areas defined in the PDL specifications to watch areas defined by the specifications to become variable. If the control task identifies a data area as being a variable data area, it reserves the graphic states and/or other associated graphic attributes **23** of that variable data area in a cache or memory **24** and then moves on to the next data area defined by the particular PDL specification, usually without allowing any data defined by the variable data area to be added to the template bitmap. The control task also looks for predetermined attributes defined in the data areas to determine if the data area is defining the importation of a sub-template bitmap. If the control task detects such an attribute, rather than storing the graphic states associated with the data area in the cache **24**, it stores a placeholder **23'** in memory, which will instruct the merge task that a sub-template is to be incorporated into the present template or sub-template bitmap during the merge task **28**, and will also include information identifying the one or a group of the sub-templates that may be merged into the present template or sub-template bitmap. Once the control task completes its processing of the particular PDL specification, the control task saves the template display list **25** or sub-template display list **27** in memory **26**. The template and sub-template display lists **25, 27** will include a plurality of rendering commands for the static data defined in their respective PDL specifications. Each rendering command designates a particular static data area or object to be rendered, the graphic states and/or graphic attributes to be applied to the static data area and the offset address at which the rendered object, if any, in the static data area is to be over written onto the final bitmap.

[0031] Next, a merge task **28**, having access to the variable data records **17** from the merge file **16** is executed to apply the reserved graphic states and/or graphic attributes **23** to the variable data records **17**, creating rendering commands for that variable data record as defined by the graphic states. The merge task **28** retrieves a copy **25'** of the template display list from the memory **26** and merges the variable data rendering commands with the template display list to create a merged display list **30**. The merge task will also look for place holders **23'** among the graphic states stored in the memory **24** during this merging operation. If a place holder **23'** is detected, the merge task will access a copy **27'** of the display list of the sub-template corresponding to the place holder and will then merge the rendering commands from the display list of the sub-template **27'** with the merged display list **30**. It is noted that the sub-template may also include an associated cache of graphic states and/or graphic attributes corresponding to variable data areas (or even additional levels of sub-templates) defined within the sub-template. Therefore, if such a cache is present with a particular sub-template, the merge task will apply such stored graphic states and/or graphic attributes to the present variable data fields in the variable data record **17** linked to the graphic states to therefore create rendering commands for such variable data fields. These rendering commands are also merged into the display list **30**.

[0032] Once the merged display list **30** is created, the controller **10** performs a rendering task **32** to render the merged display list **30** into a plurality of bitmap bands **34** for dispatching to at least one print engine **36**. A general method for performing the above control task is described in U.S. Pat. No. 5,729,665, the disclosure which is incorporated herein by reference. A method and system architecture for performing the above merging, banding and dispatching operations are respectively described in U.S. Pat. Nos. 5,594,860 and 5,796,930, the disclosures of which are also incorporated herein by reference.

[0033] As shown in **FIG. 2, a** graphical flow diagram representation of the control task is illustrated. As discussed above, the primary function of the control task is to monitor a PDL interpreter program which interprets the PDL specifications for the template **(14)** and the sub-templates **15** to create display lists **25**, **27**, containing the rendering commands for the static data in the PDL specifications, and a cache of graphic states and/or graphic attributes corresponding to the variable data areas identified by the PDL specifications. While the PDL specifications are typically in the form of a list of PDL commands (as described above) the specifications **14**, **15***a* and **15***b* shown in **FIG. 2** are shown, for clarity, as they would have appeared to the artist using the application program (such as QuarkXPress®) to create such PDL specifications.

[0034] As shown in **FIG. 2** the template PDL file **14** includes a plurality of static data areas **38** and a plurality of variable data areas **40**. The variable data areas are identified by the control task as a text string surrounded by special characters, "<<" and ">>". The phrase or word within the special characters corresponds to the field name for the particular variable data area. These strings may also be followed by an attribute command string **42**, which may define special attributes to be applied to the particular variable data area. With respect to the template PDL file shown in **FIG. 2**, the variable data identifier with the field name "PICTURE" is followed by the attribute command string "SELECT", which, as will be discussed below, informs the control task that the particular variable data area corresponds to the insertion of a sub-template.

[0035] As discussed above, the rendering commands for the static data areas **38** in the template PDL file are stored in a template display list **25** and the graphic states **23** of the variable data areas **40** are stored in a cache **24**. As also discussed above, and as will be discussed in detail below, the graphic state stored in the cache for the variable data area having the "select" attribute string is merely a place holder **23'**, which will instruct the merge file to insert a sub-template bit map into the template bit map being rendered.

[0036] The control task will also interpret the sub-template PDL files **15***a*, **15***b*, shown as sub-template "A" and sub-template "B" in **FIG. 2**. Sub-template "A"**15***a* includes two static data areas **38**, and therefore a sub-template display list **27***a* is created for the sub-template "A" PDL file, including the rendering commands for such static data areas. The sub-template "B" PDL file **15***b* includes a static data area **38** and a variable data area **40**. Therefore, the control task will create a sub-template display list **27***b*, including the rendering command for the static data area and will cache the graphic states **23'** for the variable data area. It is noted here that the variable data identifiers in the sub-template PDL specifications may also include attribute strings for special processing, such as specifying additional levels of sub-template files. For the purposes of simplicity, the present example is shown with only one level of sub-templates.

[0037] As shown in **FIG. 3**, the merge task will access a copy **25'** of the template display list and will also access a first record **46** from the merge file **16**. Note that the first record has record fields, in the form of text strings, for each of the field names VAR1, VAR2, VAR3 and VAR4. For the field name PICTURE, the record includes a name (in this example either A or B) corresponding to the sub-template to be inserted for the variable data identifier having the field name "PICTURE." The merge task accesses the rendering commands from the copy of the template display list **25'** to add to a merged display list **30**. Such rendering commands will be processed by the rendering task **32** to generate the bit maps **48** for the static data areas from the template PDL specification **14** to appear in the merged bitmap **52**. The merge task will link the cached graphic states **23** to the to the record fields by matching the field names associated with the cached graphic state to the field names in the merge file. For example, the cached graphic states for the variable data identifier **40** having the field name "VAR1" will be linked to the record fields in the merge file under the field name "VAR1." Once linked, the merge task will apply the graphic states **23** to the data in the associated record field to create rendering commands for such data, which are to merged into the merged display list **30**. Such rendering commands will be processed by the rendering task **32** to generate the bit maps **50** in the merged bitmap **52**. This is done for each of the graphic states in the cache.

[0038] When the merge task reaches the place holder **23'** in the template graphic states cache, it will link the place holder **23'** to the to the record fields by matching the field name associated with the the place holder **23'** to a field name in the merge file. For example, the he place holder **23'** for the variable data identifier **40** having the field name "PICTURE" will be linked to the record fields in the merge file under the field name "PICTURE." The field name in the record will identify which of the sub-templates to merge into the merged display list **30** and eventually into the merged bitmap **52**. Because the merge record **46** indicates that the sub-template "B" is to be used, the merge task accesses the sub-template display list **44***b* and merges its rendering commands into the merged display list **30**. Such rendering commands will be processed by the rendering task **32** to generate the bit maps **54** in the merged bitmap **52**. The merge task also accesses the associated cache of graphic states for the sub-template, and applies the graphic states to the record fields linked to the graphic states so as to generate rendering commands for the data of the record fields that are to be merged into the merged display list **30**. Such rendering commands will be processed by the rendering task **32** to generate the bit maps **56** in the merged bitmap **52**.

[0039] Note that if this sub-template "B" included a further level of sub-templates, the cache graphic states for the sub-template would also include a place holder, and the merge task would access the sub-templates associated with this place holder for another level of sub-template processing.

[0040] The final merged big map **52** includes the static data bitmaps **48** defined by the template PDL file **14**, the

static data bitmaps **54** defined by the sub-template "B" PDL file **15***b*, the variable data bitmaps **50** having the graphic attributes corresponding to the cached graphic states for the variable data identifiers **40** in the template PDL file **50**, and the variable data bitmaps **56** having the graphic attributes corresponding to the cached graphic states for the variable data identifiers **40** in the sub-template "B" PDL file **15***b*. The location of the bit maps **54**, **56** from the sub-template "B" PDL specification can be defined by the job ticket file (see the Appendix to this disclosure). Furthermore, it is within the scope of the invention to include a graphic state or graphic attribute with the place holder that corresponds to the location of the variable data identifier (this graphic attribute may also include other information such as orientation, size, etc.). This additional graphic attribute may be stored with the place holder and applied to the bit map data from the sub-template file during the merging operation. For example, a graphic state corresponding to the location of the variable data identifier having the attribute **42** corresponding to the sub-template may be stored with the place holder in the graphic state cache to direct the merge task to place the bit maps from the sub-template in the merge bit map **52** in the location directed by the stored graphic state.

[**0041**] An embodiment of the present invention is illustrated by way of example in FIGS. **4-8**. As illustrated in **FIG. 4**, the job ticket file **12** contains a group header **60**"[PageDescriptionLanguageFile]" indicating that the phrases below that group header **60** are the names of page description language files to be processed by the control task. In the present example, there are two page description language files: a file "letter_master"**62** and a file "all_maps"**64**. The job ticket file **12** includes a group header **66**"[letter_master]," under which are defined the location and attributes for that PDL file. Note that with this PDL file no attributes are defined and only the path location for the file is indicated. Another group header "[all_maps]" defines the path and attributes for the all_maps PDL file. Note that an attribute string **70**"SubTemplate=true" indicates that this file is a sub-template file and the attribute string **72**"Templates= South, East, West, Midwest" indicates that the file includes four sub-templates, named South, East, West and Midwest.

[**0042**] The job ticket also includes a group header **74**" [MergeFiles]" identifying the names of the merge files to be used in the merge task. In the present case a single merge file is named "merge." Below that, a group header **78**"[merge]" is given, under which the attributes and location of the merge file is set forth. The attribute strings for this merge file indicate that the merge file is delimited and includes merge headers. The attribute strings also indicate that the records are delimited by a carriage-return/line-feed character and the particular fields in each record are delimited by a tab character. A complete description of the different attributes that can be defined for the PDL files is described in detail in the Appendix below.

[**0043**] As illustrated in **FIG. 5**, the merge file **16** has a platform-independent data file that contains the "variable" data to be merged into the path defined in the PDL specification, and also includes names associated with the sub-templates to be merged into the PDL specification during the merge task. The merge file in the present example includes a plurality of rows of merge records separated by carriage-return/line space characters, where each record includes the following fields: "fname,""lname,""prefix,""title,""company,""address,""zip,""region,""city" and "state." As will be described below, the data in the field "region" doubles as variable data and also as a name of a sub-template to be merged into the final bit maps.

[**0044**] As illustrated in **FIG. 6**, the designer will utilize an application program to create a document containing static data and variable data identifiers. The application program will then be directed to create a PDL specification of the document by the designer. The variable data identifiers **80** each include a field name surrounded by special characters, "<<" and " >>", and may also include an attribute string **82** following the field name and special characters. The attribute string will be described below. The PDL specification generated by the application program will include the graphic states of the variable data identifiers **80**. These graphic states can include the font size (i.e., 12 point), the type-font (i.e., Helvetica), the orientation (i.e., horizontal), the location such as x and y coordinates, and the like. As discussed above, the control task will create a display list with the rendering commands for the static data in the PDL specification and will cache the graphic states for the variable data identifiers without transferring the rendering commands for the variable data identifiers to the display list. The variable data identifier in the bottom center portion of the page includes the "select" attribute, indicating to the control task that a sub-template bit map is to be inserted into the document. The field name "region" associated with this variable data identifier indicates that the sub-template name will be under the heading "region" in the merge file.

[**0045**] Referring to **FIG. 5**, the regions named in the merge file are South, East, West and Midwest. Therefore, referring to **FIG. 4**, the sub-templates having the name South, East, West and Midwest are found in the PDL file defined under the "all_maps" group header **(68)** in the job ticket. Note that the attributes defined under the "all_maps" group header do not include an attribute directing the location of the sub-template. Therefore, the lower left-hand corner of the sub-template merged into the final document will be directed by the locational graphic states of the variable data identifier stored along with the place holder in the graphic state cache.

[**0046**] **FIG. 7** illustrates the sub-template PDL file **15**, including the four sub-templates: South **84***a*, East **84***b*, West **84***c* and Midwest **84***d*. The merge task will access a variable data record **86** from the merge file **16** and a copy of the display list for the template PDL file **25**. As discussed above, the merge task will generate rendering commands for the variable data records in the merge file by applying the cached graphic states linked to the variable data records. These rendering commands will be merged into the merged display list along with the rendering commands from the display list for the template PDL file. The merge task will also merge the rendering commands from the display list of the sub-template named by the variable data records into the merged display list. The rendering task will process the rendering commands in the merged display list to generate the final merged bit map for the present variable data record **86**. This bit map appears in **FIG. 8**.

[**0047**] Referring to **FIGS. 5, 6** and **8**, the merge task will apply the cached graphic states linked to the variable data fields in the variable data record **86** as follows. The first graphic state in the cache will be for the first variable data

identifier **80***a*. The field name for this variable data identifier **80***a* is "fname," which in the particular variable data record, corresponds to "Shannon." Therefore, the final merged bit map will include a bit map of the text, "Shannon"**88***a*, having the graphic states for the variable data identifier **80***a*. Likewise, the second cached graphic state will be for the variable data identifier **80***b* which includes a field name "lname," corresponding to the term "Janzen" in the particular variable data record **86**. Therefore, the final merged bit map will include a bit map of the text, "Janzen"**88***b*, **-15** having the graphic states for the variable data identifier **80***b*. Correspondingly, the remaining graphic states, except for those of variable data identifier **88***m*, which is the variable data identifier including the sub-template attribute **82**, will be processed in the same way resulting in bit maps **88***c*-**88***n* in the merged bitmap.

[**0048**] When the merge task reaches the place holder in the graphic state cache associated with the variable data identifier **80***m*, it will refer to the merge record for the name of the sub-template under the field name "Region," which in the present example is "South." Referring to **FIG. 7**, the sub-template having the name "South" is sub-template **84***a*. Accordingly, the merge file will then merge the rendering commands from the display list of the sub-template **84***a* into the merged display list. Some or all of these rendering commands will also be modified by a graphic attribute corresponding to the location that the sub-template is to be merged into the merged bit map. As discussed above, this graphic attribute may be taken from the graphic state of the variable data identifier **80***m* or may be defined in the job ticket file.

[**0049**] The present invention also provides for the flowing of sub-templates into a path defined by the template specification. Such a feature is based upon the invention disclosed in U.S. patent application Ser. No. 08/897,467, filed Jul. 18, 1997. Specifically, the feature includes the steps of: associating a path defined by the template PDL specification with the variable data identifier with the "sub-template" attribute string; and merging the sub-template(s) into the path according to the path boundary and according to a predefined flow rule (as will be defined in the job ticket). The path may be associated with the attribute string, for example, by having the PDL command for the path immediately follow the PDL command for the attribute string in the PDL specification, or by having the PDL command for the path "grouped" with the PDL command for the attribute string using a GROUP command provided by the application program.

[**0050**] The following Appendix provides a preferred compilation of commands and parameter definitions that can be specified in the job ticket file **12** for the sub-template application as described above. Each entry provides a particular command header, the syntax for the command, any relevant remarks for the use of the command, examples, etc. As will be appreciated by one of ordinary skill in the art, the present invention includes any and all additional functions, features and attributes detailed in the Appendix.

APPENDIX

[PageDescriptionLanguageFile]

A group that provides a list of tags which you create to describe the PDL file(s) to be used in the print job. Each tag will become a user-defined group to give additional information about a specific PDL file.

Syntax

[PageDescriptionLanguageFile]
PDL File Tag A
PDL File Tag B

Remarks

Required

The number of tags listed equals the number of PDL files that VariScript is to interpret during the job. Every tag that appears under this initial [PageDescriptionLanguageFile] group will become a new group name in succeeding sections of the Job Ticket.

Explanation

PDL File Tag A

Create a descriptive name for the first PDL file used in the print job. This tag is for use within the Job Ticket only and is not used outside of that context.

PDL File Tag B

Create a descriptive name for the next PDL file used in the print job. This tag is for use within the Job Ticket only and is not used outside of that context.

Example

[PageDescriptionLanguageFile]
Cover Form
Contents Form
Letter Form

A user-defined tag name for a group that provides information about a PDL file and corresponds to a descriptive tag that you created under the initial [PageDescriptionLanguageFile] group.

Syntax

[PDL File Tag]
File Path =
<other host access parameters>
<VariScript rendering parameters>
Templates =
Sub Template =
Sub Template Area =

See Also

Templates

Remarks

A separate [PDL File Tag] group is required for each descriptive tag listed under the initial [PageDescriptionLanguageFile] group.

APPENDIX-continued

Case sensitivity of the values that you define depends on the host operating system.

Explanation [PDL File Tag]

Take the descriptive tag under the initial [PageDescriptionLanguageFile] group and write it here as a group name within brackets [].

File Path =

Write the drive, path, and file name for the PDL file being described. The format of your notation is dependent on your host computer. See the FilePath element description in Chapter 3.

<other host access parameters>

Define values for any other host access parameter for which the default value is not accurate for access to this PDL file. See the element descriptions in Chapter 3.

<VariScript rendering parameters>

Define a value for any VariScript rendering parameter which will be applied to all of the templates in this specific PDL file. These elements include PSAnchor, PSLength, PSN Planes, PSOrientation, PSResX, PSResY, PSRotation, PSScale, PSScaleX, PSScaleY, PSTranslateX, PSTranslate Y, and PSWidth. See the element descriptions in Chapter 4.

Applying a VariScript rendering parameter here will override the definition of the same parameter in the configuration file and in the [JobSetup] group This definition, in turn, can be overridden by the definition of the same parameter in the [Template Tag] group.

Templates =

See the Templates element description.

SubTemplate =

See the Sub Template element description.

SubTemplate Area =

See the Sub Template Area element description.

Example [Cover Form]

File pate = forms/cover.ps

Templates = tempA, tempB, tempC, tempD

TEMPLATES

An element that provides a list of descriptive tags which you create to represent the names of the templates in a PDL file.

Syntax Templates = Template Tag A, Template Tag B, Template Tag Z

Remarks Templates is an element within the user-defined [PDL File Tag] group.

NOTE: Each descriptive template tag that you create is for use within the Job Ticket only and is not used outside of that context.

The template tags mustbeuniquewithintheprintjob and must appear in theorder in which the templates are defined in the PDL file(s). A template that requires no further definition can be represented by a blank tag.

Each tag that appears as a parameter of Templates may become a user-defined group name listed elsewhere in the Job Ticket. The Templates statement simply lets VariScript know that it is to look for user-defined groups and then provides the names (tags) of these groups.

Therefore, in theory, a PDL file with ten pages could have up to ten template tags listed within the Templates element. If any templates need not be named, the order of templates can be preserved by inserting blank template tags into the list.

Explanation Template Tag A

Create a descriptive name for the first template in this PDL file. This tag is for use within the Job Ticket.

Template Tag B

Create a descriptive name for the next template in this PDL file. This tag is for use within the Job Ticket.

And so on.

Example Templates = tempA, tempB, ,tempD

SUBTEMPLATE

An element that identifies the templates within the specified PDL file as being subtemplates.

Syntax SubTemplate = {True | False}

Remarks Optional.

A subtemplate is a template or PDL page that is used as an object to be inserted on another page.

A default value for SubTemplate is False.

Explanation {True | False}

If all (or most) of the templates within the specified PDL ffie are to be identified as subtemplates, type True.

If all (or most) of the templates within the specified PDL file are NOT subtemplates, type False.

Example SubTemplate = True

APPENDIX-continued

SUBTEMPLATE AREA

An element that assigns a subtemplate name and describes the portion of a template to be used as a subtemplate.

Syntax SubTemplate Area = Name "<SubName>" X <Units> <Unit Type>\
Y<Units x Unit Type> Width <Units> <Unit Type>\
Height <Unit> <Unit Type>

See Also SubTemplate

Remarks Optional if SubTemplate = True. Ignored if SubTemplate = False.
This element may be used to specify what part of a template should be used as a subtemplate and to give that extracted portion a subtemplate name.
When this element is defined at a PDL file level, the system will recognize the same extracted portion of each template in the file as being a subtemplate.

Explanation Name "<SubName>"
This value assigns a specific name to the subtemplate.
Type the word Name followed by a space. For "<SubName>", type the name to be assigned to this subtemplate. Enclose the subtemplate name in double quotation marks ("").

NOTE: A subtemplate will be known by the official name of the template, unless it is given another name through the SubTemplate Area element.
The official template name is defined by the method of highest precedence. The template name of lowest precedence is the default system-generated template name, followed by the template name you physically define on the PDL template. Of highest precedence is the template name defined using the NewName element in the [Template Tag] group.
Example: Name "mysub1"

X<Unit> <Unit Type>
This value identifies the subtemplate's offset, the horizontal distance between the left side of the template and the area to be extracted.
Type the character X followed by a space. For <Units>, type the horizontal distance from the template's left side to the beginning of the area to be extracted.
An X value of 0 represents a location flush along the left side of the template. Increasing the value of X locates the area to be extracted the defined distance to the right.
This value is expressed in unitized format if the unit type is different from the default unit type defined in the Units element. Possible <Unit Type> values are:

cm	for centimeters
dm	for decimeters
dots	for dots
ft	for feet
in	for inch (default value)
m	for meters
mils	for mils
mm	for millimeter
nm	for nanometers
pixels	for pixels
pts	for points
pulses	for pulses
yds	for yards

The default value for X is 0.
Y <Units> <UnitType>
This value identifies the vertical distance between the bottom of the template and the area to be extracted.
Type the character Y followed by a space. For <Units>, type the vertical distance from the bottom of the template to the beginning of the area to be extracted.
A Y value of 0 represents a location flush along the bottom of the template. Increasing the value of Y locates the area to be extracted the defined distance above the bottom of the template.
The Y value is expressed in unitized format if the unit type is different from the default unit type defined in the Units element. Possible <Unit Type> values are listed above.
The default value for Y is 0.
Width <Unit> <Unit Type>
This value identifies the width of the portion to be extracted (starting at the X, Y coordinates).
Type the word Width followed by a space. For <Units>, type the width of area to be extracted from the template. This measurement is the X (horizontal) dimension of the area to be extracted.
This default value for Width is equal to the width of the template.

APPENDIX-continued

Heights <Units> <Unit Type>
The value identifies the height (length) of the portion to be extracted (starting at the X, Y coordinates).
Type the word Height followed by a space. For <Units>, type the height of the area to be extracted from the template. This measurement is the Y (vertical) dimension of the area to be extracted.
This value is expressed in unitized format if the unit type is different from the default unit type defined in the Units element. Possible <Unit Type> values are listed above.
The default value for Height is equal to the width of the template.

Example

[PageDescriptionLanguageFile]
ps1
ps2
[ps1]
File Path = /mydir/mypsfile.ps
Templates = temp1, temp2
PSScale = .8
[ps2]
File Path = /mydir/mysubtmp.ps
SubTemplate = True
Templates = temp3, temp4, temp5, temp6
SubTemplate Area - X 1in Y 2in Width 3in Height 4in

This example depicts two PDL files.
File ps1 is a "normal" PDL file containing two "normal" templates
File ps2 is identified as a subtemplate file (SubTemplate = True). The same area (SubTemplateArea) on each template is ps2 will be defined as a subtemplate. This area represents a 3-inch wide by 4-inch long portion starting from 1 inch to the right and 2 inches above the lower left corner of the template. Since no Name <SubName> value is given, each subtemplate will take the official name of its template.

[TEMPLATE TAG]

A user-defined tag name for a group that provides information about a template and corresponds to a descriptive tag that you create within the Templates element.

Syntax

[Template Tag]
<VariScript rendering parameters>
New Name = <Template New Name>
Sub Template =
Sub Template Area =

See Also Templates

Remarks Optional.
A separate [Template Tag] group is required for each descriptive tag listed in the Templates element which you will identify as a subtemplate or assign a new template name or a template-level marketing parameter.

Explanation

[Template Tag]
Take the descriptive tag within the TempleNames element and write it here as a group name within brackets [].
<VariScript rendering parameters>
Define a value for any VariScript rendering parameter which will be applied to this specific template. These elements include PSAnchor, PSLength, PSNPlanes, PSOrientation, PSResX, PSResY, PSRotation, PSScale, PSScaleX; PSScale Y, PSTranslater X, PSTranslate Y, and PSWidth. See the element descriptions in Chapter 4.
A rendering parameter applied within this group has the highest precedence. It will override the definition of the same parameter in the configuration file, in the [JobSetup] group, and in the [PDLFileTag] group.
NewName =
See the NewName element description
SubTemplate =
See the SubTemplate element description.
SubTemplate Area =
See the SubTemplate Area element description.

Example

[TempA]
NewName = lotto_tikt
PSScale = 0.8125
SubTemplate = True

NEWNAME

An element that defines a new name for the specified template. This new name overrides the system-generated default template name or the template name that you may have placed directly on this template within the PDL file.

Syntax NewName = <TemplateNewName>

Remarks Optional.

APPENDIX-continued

	The template receives its name in one of three ways: The system automatically generates a default template name. (lowest precedence) You can physically name the template when you are working in your design application (for example, QuarkXPress) before you output to a PDL file. You can define a new template name in the Job Ticket within the NewName element. (highest precedence) VariScript will recognize only one template name for each template. Therefore, a template name assigned by using a method of higher precedence will overwrite a name of lower precedence. For example, a name defined directly on the template will overwrite the system-generated default, and, in turn, be overwritten by a name defined using the NewName element. The NewName element does NOT have a default value.
Explanation	<TemplateNewName> Specify the template's new name.
Example	NewName = lotto_tikt
SUBTEMPLATE	
	An element that identifies this templates as being a subtemplate.
Syntax	SubTemplate = {True | False}
Remarks	Optional. A subtemplate is a template or PDL page that is used as an object to be inserted on another page. The default value for SubTemplate is False.
Explanation	{True | False} If this template is to be identified as a subtemplate, type True. If this template is NOT a subtemplate, type False.
Example	SubTemplate = True

[0051] While the forms of apparatus and procedure herein described constitute preferred embodiments of the invention, it is to be understood that the invention is not limited to such precise embodiments, and that variations can be made therein without departing from the scope of the invention.

What is claimed is:

1. A method for generating a plurality of bitmaps comprising the steps of:

(a) generating a template page description language specification, the template specification including template data and associated graphic attributes defining how the template data is to appear on a printed page, the template specification including at least one variable data identifier;

(b) generating a plurality of sub-template page description language specifications, each sub-template specification including sub-template data and associated graphic attributes defining how the sub-template data is to appear on a portion of a printed page;

(c) interpreting the template specification so as to generate a plurality of template rendering commands, and during the interpreting step, identifying the variable data identifier;

(d) saving the plurality of template rendering commands into memory;

(e) associating the variable data identifier with the plurality sub-template specifications;

(f) accessing a first sub-template specification from the plurality of sub-template specifications;

(g) processing the first sub-template specification so as to generate a plurality of first sub-template rendering commands;

(h) accessing a copy of the plurality of template rendering commands from memory;

(i) merging the copy of the plurality of template rendering commands with the plurality of first sub-template rendering commands so as to provide a first merged plurality of rendering commands;

(j) generating a first merged bitmap from the first merged plurality of rendering commands;

(k) accessing a next sub-template specification from the plurality of sub-template specifications;

(l) processing the next sub-template specification so as to generate a plurality of first sub-template rendering commands;

(m) accessing a copy of the plurality of template rendering commands from memory;

(n) merging the copy of the plurality of template rendering commands with the plurality of next sub-template rendering commands so as to provide a next merged plurality of rendering commands; and

(o) generating a next merged bitmap from the next merged plurality of rendering commands.

2. The method of claim 1, wherein steps (k) through (o) are repeated for the remaining plurality of sub-template specifications.

3. The method of claim 1, wherein:

the variable data identifier includes a associated graphic attribute;

prior to the merging step (i), the graphic attribute associated with the variable data identifier is saved to memory;

the merging step (i) includes the steps of accessing the graphic attribute associated with the variable data identifier from memory and applying it to the plurality of first sub-template rendering commands so that a bitmap generated by the plurality of first sub-template rendering commands will include the graphic attribute associated with the variable data identifier; and

the merging step (p) includes the steps of accessing the graphic attribute associated with the variable data identifier from memory and applying it to the plurality of next sub-template rendering commands so that a bitmap generated by the plurality of next sub-template rendering commands will include the graphic attribute associated with the variable data identifier.

4. The method of claim 1, wherein the variable data identifier includes an associated graphic attribute that is discarded during the processing step.

5. The method of claim 1, wherein:

wherein the associating step includes the step of referring to a file containing a name corresponding to at least one of the locations and identities of sub-template specifications; and

the file includes a definition of a new graphic attribute to be applied to the sub-template specifications associated with the name.

6. The method of claim 5, wherein the new graphic attribute includes the location of sub-template bitmaps in merged bitmaps.

7. The method of claim 5, wherein the new graphic attribute includes the size of sub-template bitmaps in merged bitmaps.

8. A method for generating a plurality of bitmaps comprising the steps of:

(a) generating a template page description language specification, the template specification including template data and associated graphic attributes defining how the template data is to appear on a printed page, the template specification including at least one variable data identifier;

(b) generating a plurality of sub-template page description language specifications, each sub-template specification including sub-template data and associated graphic attributes defining how the sub-template data is to appear on a portion of a printed page;

(c) processing the template specification so as to generate a template bitmap, and during the processing step, identifying the variable data identifier;

(d) saving the template bitmap into memory;

(e) associating the variable data identifier with the plurality of sub-template specifications;

(f) accessing a first sub-template specification from the plurality of sub-template specifications;

(g) processing the first sub-template specification so as to generate a first sub-template bitmap;

(h) accessing a copy of the template bitmap from memory;

(i) merging the copy of the template bitmap with the first sub-template bitmap so as to provide a first merged bitmap;

(j) accessing a next sub-template specification from the plurality of sub-template specifications;

(k) processing the next sub-template specification so as to generate a next sub-template bitmap;

(l) accessing a copy of the template bitmap from memory; and

(m) merging the copy of the template bitmap with the next sub-template bitmap so as to provide a next merged bitmap.

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