

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
 Stylesheet Version v1.2

EPAS ID: PAT4889901

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT
CONVEYING PARTY DATA	
Name	Execution Date
SUJATHA KASHYAP	01/04/2018
ANNE E. GATTIKER	12/27/2017
KAIPENG LI	12/27/2017
SAMUEL THOMAS	03/29/2018
MINH NGOC BINH NGUYEN	12/27/2017
THOMAS HUBREGTSEN	01/29/2018
RECEIVING PARTY DATA	
Name:	INTERNATIONAL BUSINESS MACHINES CORPORATION
Street Address:	NEW ORCHARD ROAD
City:	ARMONK
State/Country:	NEW YORK
Postal Code:	10504
PROPERTY NUMBERS Total: 1	
Property Type	Number
Application Number:	15856499
CORRESPONDENCE DATA	
Fax Number:	(860)286-0115
<i>Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.</i>	
Phone:	860-286-2929
Email:	usptopatentmail@cantorcolburn.com
Correspondent Name:	CANTOR COLBURN LLP - IBM AUSTIN
Address Line 1:	20 CHURCH STREET
Address Line 2:	22ND FLOOR
Address Line 4:	HARTFORD, CONNECTICUT 06103
ATTORNEY DOCKET NUMBER:	P201705388US01
NAME OF SUBMITTER:	DAVID K. KINCAID
SIGNATURE:	/dkk/
DATE SIGNED:	03/29/2018
This document serves as an Oath/Declaration (37 CFR 1.63).	

PATENT

Total Attachments: 18

source=80Q0989#page1.tif
source=80Q0989#page2.tif
source=80Q0989#page3.tif
source=80Q0989#page4.tif
source=80Q0989#page5.tif
source=80Q0989#page6.tif
source=80Q0989#page7.tif
source=80Q0989#page8.tif
source=80Q0989#page9.tif
source=80Q0989#page10.tif
source=80Q0989#page11.tif
source=80Q0989#page12.tif
source=80Q0989#page13.tif
source=80Q0989#page14.tif
source=80Q0989#page15.tif
source=80Q0989#page16.tif
source=80Q0989#page17.tif
source=80Q0989#page18.tif

IBM DOCKET NUMBER: P201705388US01

DECLARATION (37 C.F.R. 1.63) FOR UTILITY PATENT APPLICATION USING AN
APPLICATION DATA SHEET (37 C.F.R. 1.76) AND ASSIGNMENT

Title of Invention: CONSTRUCTING, EVALUATING, AND IMPROVING A SEARCH
STRING FOR RETRIEVING IMAGES INDICATING ITEM USE

As a below named and undersigned inventor, I hereby declare that:

This declaration is directed to the attached application, or (if following box is checked):

☒ United States application or PCT international application number 15/856,499
filed on December 28, 2017.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the
application.

I have reviewed and understand the contents of the application, including the claims.

I am aware of the duty to disclose to the United States Patent and Trademark Office all information
known to me to be material to patentability as defined in 37 CFR Section 1.56.

Whereas, I ("ASSIGNOR") have made certain inventions, improvements, and discoveries (herein referred
to as the "Invention") disclosed in the above-identified patent application and further identified by the
IBM Docket Number provided above in the header of this document;

Whereas, International Business Machines Corporation (herein referred to as the "ASSIGNEE"), a
corporation of New York having a place of business at Armonk, New York, desires to acquire, and I
desire to grant to the ASSIGNEE, my entire worldwide right, title, and interest in and to the Invention and
in and to any and all patent applications and patents directed thereto;


Now, therefore, for good and valuable consideration, the receipt and sufficiency thereof being hereby
acknowledged, I hereby sell or have sold, assign or have assigned, and otherwise transfer or have
transferred to the ASSIGNEE, its successors, legal representatives, and assigns, my entire worldwide
right, title, and interest in and to the Invention, the above-identified United States patent application, and
any and all other patent applications and patents for the Invention which may be applied for or granted
therefor in the United States and in all foreign countries and jurisdictions, including all divisions,
continuations, reissues, reexaminations, renewals, extensions, counterparts, substitutes, and extensions
thereof, and all rights of priority resulting from the filing of such applications and granting of such
patents. In addition, I hereby authorize and request the Director of the United States Patent and
Trademark Office to issue any United States Patent, and foreign patent authorities to issue any foreign
patent, granted for the Invention, to the ASSIGNEE, its successors, legal representatives, and assigns, my
entire worldwide right, title, and interest in and to the same to be held and enjoyed by the ASSIGNEE, its
successors, legal representatives, and assigns to the full end of the terms for which any and all such
patents may be granted, as fully and entirely as would have been held and enjoyed by me had this
Assignment not been made; and I agree to execute any and all documents and instruments and perform all
lawful acts reasonably related to recording this Assignment or perfecting title to the Invention and all
related patents and applications, in the ASSIGNEE, its successors, legal representatives, and assigns,

whenever requested by the ASSIGNEE, its successors, legal representatives, or assigns.

I acknowledge my prior and ongoing obligations to sell, assign, and transfer my rights under this Assignment to the ASSIGNEE and am unaware of any reason why I may not have the full and unencumbered right to sell, assign, and transfer my rights hereby sold, assigned, and transferred, and have not executed, and will not execute, any document or instrument in conflict herewith. I also hereby grant the ASSIGNEE, its successors, legal representatives, and assigns, the right to insert in this Assignment any further identification (including, but not limited to, patent Application Number) which may be necessary or desirable for recordation of this Assignment. This Assignment is governed by the substantive laws of the State of New York, and any disputes will be resolved in a New York state court or federal court sited in New York.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

(1) Legal Name of Inventor: Sujatha Kashyap

Signature: 

Date: 01-04-2018

(2) Legal Name of Inventor: Anne E. Gattiker

Signature: _____

Date: _____

(3) Legal Name of Inventor: Kaipeng Li

Signature: _____

Date: _____

(4) Legal Name of Inventor: Samuel Thomas

Signature: _____

Date: _____

[IF MORE INVENTORS, ADDITIONAL SIGNATURE PAGE(S) FOLLOWS]

IBM DOCKET NUMBER: P201705388US01

(5) Legal Name of Inventor: Minh Ngoc Binh Nguyen

Signature: _____ Date: _____

(6) Legal Name of Inventor: Thomas Hubregtsen

Signature: _____ Date: _____

IBM DOCKET NUMBER: P201705388US01

DECLARATION (37 C.F.R. 1.63) FOR UTILITY PATENT APPLICATION USING AN
APPLICATION DATA SHEET (37 C.F.R. 1.76) AND ASSIGNMENT

Title of Invention: CONSTRUCTING, EVALUATING, AND IMPROVING A SEARCH
STRING FOR RETRIEVING IMAGES INDICATING ITEM USE

As a below named and undersigned inventor, I hereby declare that:

This declaration is directed to the attached application, or (if following box is checked):

☒ United States application or PCT international application number 15/856,499
filed on December 28, 2017.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the
application.

I have reviewed and understand the contents of the application, including the claims.

I am aware of the duty to disclose to the United States Patent and Trademark Office all information
known to me to be material to patentability as defined in 37 CFR Section 1.56.

Whereas, I ("ASSIGNOR") have made certain inventions, improvements, and discoveries (herein referred
to as the "Invention") disclosed in the above-identified patent application and further identified by the
IBM Docket Number provided above in the header of this document;

Whereas, International Business Machines Corporation (herein referred to as the "ASSIGNEE"), a
corporation of New York having a place of business at Armonk, New York, desires to acquire, and I
desire to grant to the ASSIGNEE, my entire worldwide right, title, and interest in and to the Invention and
in and to any and all patent applications and patents directed thereto;

Now, therefore, for good and valuable consideration, the receipt and sufficiency thereof being hereby
acknowledged, I hereby sell or have sold, assign or have assigned, and otherwise transfer or have
transferred to the ASSIGNEE, its successors, legal representatives, and assigns, my entire worldwide
right, title, and interest in and to the Invention, the above-identified United States patent application, and
any and all other patent applications and patents for the Invention which may be applied for or granted
therefor in the United States and in all foreign countries and jurisdictions, including all divisions,
continuations, reissues, reexaminations, renewals, extensions, counterparts, substitutes, and extensions
thereof, and all rights of priority resulting from the filing of such applications and granting of such
patents. In addition, I hereby authorize and request the Director of the United States Patent and
Trademark Office to issue any United States Patent, and foreign patent authorities to issue any foreign
patent, granted for the Invention, to the ASSIGNEE, its successors, legal representatives, and assigns, my
entire worldwide right, title, and interest in and to the same to be held and enjoyed by the ASSIGNEE, its
successors, legal representatives, and assigns to the full end of the terms for which any and all such
patents may be granted, as fully and entirely as would have been held and enjoyed by me had this
Assignment not been made; and I agree to execute any and all documents and instruments and perform all
lawful acts reasonably related to recording this Assignment or perfecting title to the Invention and all
related patents and applications, in the ASSIGNEE, its successors, legal representatives, and assigns,

whenever requested by the ASSIGNEE, its successors, legal representatives, or assigns.


I acknowledge my prior and ongoing obligations to sell, assign, and transfer my rights under this Assignment to the ASSIGNEE and am unaware of any reason why I may not have the full and unencumbered right to sell, assign, and transfer my rights hereby sold, assigned, and transferred, and have not executed, and will not execute, any document or instrument in conflict herewith. I also hereby grant the ASSIGNEE, its successors, legal representatives, and assigns, the right to insert in this Assignment any further identification (including, but not limited to, patent Application Number) which may be necessary or desirable for recordation of this Assignment. This Assignment is governed by the substantive laws of the State of New York, and any disputes will be resolved in a New York state court or federal court sited in New York.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

(1) Legal Name of Inventor: Sujatha Kashyap

Signature: _____ Date: _____

(2) Legal Name of Inventor: Anne E. Gaffiker

Signature:  _____ Date: 12/27/17

(3) Legal Name of Inventor: Kaipeng Li

Signature: _____ Date: _____

(4) Legal Name of Inventor: Samuel Thomas

Signature: _____ Date: _____

[IF MORE INVENTORS, ADDITIONAL SIGNATURE PAGE(S) FOLLOWS]

IBM DOCKET NUMBER: P201705388US01

(5) Legal Name of Inventor: Minh Ngo-Binh Nguyen

Signature: _____ Date: _____

(6) Legal Name of Inventor: Thomas Hubregtsen

Signature: _____ Date: _____

IBM DOCKET NUMBER: P201705388US01

**DECLARATION (37 C.F.R. 1.63) FOR UTILITY PATENT APPLICATION USING AN
APPLICATION DATA SHEET (37 C.F.R. 1.76) AND ASSIGNMENT**

Title of Invention: CONSTRUCTING, EVALUATING, AND IMPROVING A SEARCH
STRING FOR RETRIEVING IMAGES INDICATING ITEM USE

As a below named and undersigned inventor, I hereby declare that:

This declaration is directed to the attached application, or (if following box is checked):

☒ United States application or PCT international application number 15/856,499
filed on December 28, 2017.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I have reviewed and understand the contents of the application, including the claims.

I am aware of the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in 37 CFR Section 1.56.

Whereas, I ("ASSIGNOR") have made certain inventions, improvements, and discoveries (herein referred to as the "Invention") disclosed in the above-identified patent application and further identified by the IBM Docket Number provided above in the header of this document;

Whereas, International Business Machines Corporation (herein referred to as the "ASSIGNEE"), a corporation of New York having a place of business at Armonk, New York, desires to acquire, and I desire to grant to the ASSIGNEE, my entire worldwide right, title, and interest in and to the Invention and in and to any and all patent applications and patents directed thereto;

Now, therefore, for good and valuable consideration, the receipt and sufficiency thereof being hereby acknowledged, I hereby sell or have sold, assign or have assigned, and otherwise transfer or have transferred to the ASSIGNEE, its successors, legal representatives, and assigns, my entire worldwide right, title, and interest in and to the Invention, the above-identified United States patent application, and any and all other patent applications and patents for the Invention which may be applied for or granted therefor in the United States and in all foreign countries and jurisdictions, including all divisions, continuations, reissues, reexaminations, renewals, extensions, counterparts, substitutes, and extensions thereof, and all rights of priority resulting from the filing of such applications and granting of such patents. In addition, I hereby authorize and request the Director of the United States Patent and Trademark Office to issue any United States Patent, and foreign patent authorities to issue any foreign patent, granted for the Invention, to the ASSIGNEE, its successors, legal representatives, and assigns, my entire worldwide right, title, and interest in and to the same to be held and enjoyed by the ASSIGNEE, its successors, legal representatives, and assigns to the full end of the terms for which any and all such patents may be granted, as fully and entirely as would have been held and enjoyed by me had this Assignment not been made; and I agree to execute any and all documents and instruments and perform all lawful acts reasonably related to recording this Assignment or perfecting title to the Invention and all related patents and applications, in the ASSIGNEE, its successors, legal representatives, and assigns,

IBM DOCKET NUMBER: P201705388US01

whenever requested by the ASSIGNEE, its successors, legal representatives, or assigns.

I acknowledge my prior and ongoing obligations to sell, assign, and transfer my rights under this Assignment to the ASSIGNEE and am unaware of any reason why I may not have the full and unencumbered right to sell, assign, and transfer my rights hereby sold, assigned, and transferred, and have not executed, and will not execute, any document or instrument in conflict herewith. I also hereby grant the ASSIGNEE, its successors, legal representatives, and assigns, the right to insert in this Assignment any further identification (including, but not limited to, patent Application Number) which may be necessary or desirable for recordation of this Assignment. This Assignment is governed by the substantive laws of the State of New York, and any disputes will be resolved in a New York state court or federal court sited in New York.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

(1) Legal Name of Inventor: Sujatha Kashyap

Signature: _____ Date: _____

(2) Legal Name of Inventor: Anne E. Gattiker

Signature: _____ Date: _____

(3) Legal Name of Inventor: Kaipeng Li

Signature: Kaipeng Li Date: Dec. 27, 2017

(4) Legal Name of Inventor: Samuel Thomas

Signature: _____ Date: _____

[IF MORE INVENTORS, ADDITIONAL SIGNATURE PAGE(S) FOLLOWS]

IBM DOCKET NUMBER: P201705388US01

(5) Legal Name of Inventor: Minh Ngoc Binh Nguyen

Signature: _____ Date: _____

(6) Legal Name of Inventor: Thomas Hubregtsen

Signature: _____ Date: _____

**DECLARATION (37 C.F.R. 1.63) FOR UTILITY PATENT APPLICATION USING AN
APPLICATION DATA SHEET (37 C.F.R. 1.76) AND ASSIGNMENT**

Title of Invention: CONSTRUCTING, EVALUATING, AND IMPROVING A SEARCH
STRING FOR RETRIEVING IMAGES INDICATING ITEM USE

As a below named and undersigned inventor, I hereby declare that:

This declaration is directed to the attached application, or (if following box is checked):

☒ United States application or PCT international application number 15/856,499 filed on December 28, 2017.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I have reviewed and understand the contents of the application, including the claims.

I am aware of the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in 37 CFR Section 1.56.

Whereas, I ("ASSIGNOR") have made certain inventions, improvements, and discoveries (herein referred to as the "Invention") disclosed in the above-identified patent application and further identified by the IBM Docket Number provided above in the header of this document;

Whereas, International Business Machines Corporation (herein referred to as the "ASSIGNEE"), a corporation of New York having a place of business at Armonk, New York, desires to acquire, and I desire to grant to the ASSIGNEE, my entire worldwide right, title, and interest in and to the Invention and in and to any and all patent applications and patents directed thereto;

Now, therefore, for good and valuable consideration, the receipt and sufficiency thereof being hereby acknowledged, I hereby sell or have sold, assign or have assigned, and otherwise transfer or have transferred to the ASSIGNEE, its successors, legal representatives, and assigns, my entire worldwide right, title, and interest in and to the Invention, the above-identified United States patent application, and any and all other patent applications and patents for the Invention which may be applied for or granted therefor in the United States and in all foreign countries and jurisdictions, including all divisions, continuations, reissues, reexaminations, renewals, extensions, counterparts, substitutes, and extensions thereof, and all rights of priority resulting from the filing of such applications and granting of such patents. In addition, I hereby authorize and request the Director of the United States Patent and Trademark Office to issue any United States Patent, and foreign patent authorities to issue any foreign patent, granted for the Invention, to the ASSIGNEE, its successors, legal representatives, and assigns, my entire worldwide right, title, and interest in and to the same to be held and enjoyed by the ASSIGNEE, its successors, legal representatives, and assigns to the full end of the terms for which any and all such patents may be granted, as fully and entirely as would have been held and enjoyed by me had this Assignment not been made; and I agree to execute any and all documents and instruments and perform all lawful acts reasonably related to recording this Assignment or perfecting title to the Invention and all related patents and applications, in the ASSIGNEE, its successors, legal representatives, and assigns, whenever requested by the ASSIGNEE, its successors, legal representatives, or assigns.

I acknowledge my prior and ongoing obligations to sell, assign, and transfer my rights under this Assignment to the ASSIGNEE and am unaware of any reason why I may not have the full and unencumbered right to sell, assign, and transfer my rights hereby sold, assigned, and transferred, and have not executed, and will not execute, any document or instrument in conflict herewith. I also hereby grant the ASSIGNEE, its successors, legal representatives, and assigns, the right to insert in this Assignment any further identification (including, but not limited to, patent Application Number) which may be necessary or desirable for recordation of this Assignment. This Assignment is governed by the substantive laws of the State of New York, and any disputes will be resolved in a New York state court or federal court sited in New York.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

(1) Legal Name of Inventor: **Sujatha Kashyap**

Signature: _____ Date: _____

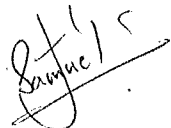
(2) Legal Name of Inventor: **Anne E. Gattiker**

Signature: _____ Date: _____

(3) Legal Name of Inventor: **Kaipeng Li**

Signature: _____ Date: _____

(4) Legal Name of Inventor: **Samuel Thomas**

Signature:  _____ Date: 03/29/2018

[IF MORE INVENTORS, ADDITIONAL SIGNATURE PAGE(S) FOLLOWS]

(5) Legal Name of Inventor: **Minh Ngoc Binh Nguyen**

Signature: _____ Date: _____

(6) Legal Name of Inventor: **Thomas Hubregtsen**

Signature: _____ Date: _____

**DECLARATION (37 C.F.R. 1.63) FOR UTILITY PATENT APPLICATION USING AN
APPLICATION DATA SHEET (37 C.F.R. 1.76) AND ASSIGNMENT**

Title of Invention: CONSTRUCTING, EVALUATING, AND IMPROVING A SEARCH
STRING FOR RETRIEVING IMAGES INDICATING ITEM USE

As a below named and undersigned inventor, I hereby declare that:

This declaration is directed to the attached application, or (if following box is checked):

☒ United States application or PCT international application number 15/856,499
filed on December 28, 2017.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I have reviewed and understand the contents of the application, including the claims.

I am aware of the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in 37 CFR Section 1.56.

Whereas, I ("ASSIGNOR") have made certain inventions, improvements, and discoveries (herein referred to as the "Invention") disclosed in the above-identified patent application and further identified by the IBM Docket Number provided above in the header of this document;

Whereas, International Business Machines Corporation (herein referred to as the "ASSIGNEE"), a corporation of New York having a place of business at Armonk, New York, desires to acquire, and I desire to grant to the ASSIGNEE, my entire worldwide right, title, and interest in and to the Invention and in and to any and all patent applications and patents directed thereto;

Now, therefore, for good and valuable consideration, the receipt and sufficiency thereof being hereby acknowledged, I hereby sell or have sold, assign or have assigned, and otherwise transfer or have transferred to the ASSIGNEE, its successors, legal representatives, and assigns, my entire worldwide right, title, and interest in and to the Invention, the above-identified United States patent application, and any and all other patent applications and patents for the Invention which may be applied for or granted therefor in the United States and in all foreign countries and jurisdictions, including all divisions, continuations, reissues, reexaminations, renewals, extensions, counterparts, substitutes, and extensions thereof, and all rights of priority resulting from the filing of such applications and granting of such patents. In addition, I hereby authorize and request the Director of the United States Patent and Trademark Office to issue any United States Patent, and foreign patent authorities to issue any foreign patent, granted for the Invention, to the ASSIGNEE, its successors, legal representatives, and assigns, my entire worldwide right, title, and interest in and to the same to be held and enjoyed by the ASSIGNEE, its successors, legal representatives, and assigns to the full end of the terms for which any and all such patents may be granted, as fully and entirely as would have been held and enjoyed by me had this Assignment not been made; and I agree to execute any and all documents and instruments and perform all lawful acts reasonably related to recording this Assignment or perfecting title to the Invention and all related patents and applications, in the ASSIGNEE, its successors, legal representatives, and assigns,

whenever requested by the ASSIGNEE, its successors, legal representatives, or assigns.

I acknowledge my prior and ongoing obligations to sell, assign, and transfer my rights under this Assignment to the ASSIGNEE and am unaware of any reason why I may not have the full and unencumbered right to sell, assign, and transfer my rights hereby sold, assigned, and transferred, and have not executed, and will not execute, any document or instrument in conflict herewith. I also hereby grant the ASSIGNEE, its successors, legal representatives, and assigns, the right to insert in this Assignment any further identification (including, but not limited to, patent Application Number) which may be necessary or desirable for recordation of this Assignment. This Assignment is governed by the substantive laws of the State of New York, and any disputes will be resolved in a New York state court or federal court sited in New York.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

(1) Legal Name of Inventor: **Sujatha Kashyap**

Signature: _____ Date: _____

(2) Legal Name of Inventor: **Anne E. Gattiker**

Signature: _____ Date: _____

(3) Legal Name of Inventor: **Kaipeng Li**

Signature: _____ Date: _____

(4) Legal Name of Inventor: **Samuel Thomas**

Signature: _____ Date: _____

[IF MORE INVENTORS, ADDITIONAL SIGNATURE PAGE(S) FOLLOWS]

(5) Legal Name of Inventor: **Minh Ngoc Binh Nguyen**

Signature: _____

Date: 12/27/2017

(6) Legal Name of Inventor: **Thomas Hubregtsen**

Signature: _____

Date: _____

IBM DOCKET NUMBER: P201705388US01

**DECLARATION (37 C.F.R. 1.63) FOR UTILITY PATENT APPLICATION USING AN
APPLICATION DATA SHEET (37 C.F.R. 1.76) AND ASSIGNMENT**

Title of Invention: **CONSTRUCTING, EVALUATING, AND IMPROVING A SEARCH
STRING FOR RETRIEVING IMAGES INDICATING ITEM USE**

As a below named and undersigned inventor, I hereby declare that:

This declaration is directed to the attached application, or (if following box is checked):

☒ United States application or PCT international application number 15/856,499
filed on December 28, 2017.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I have reviewed and understand the contents of the application, including the claims.

I am aware of the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in 37 CFR Section 1.56.

Whereas, I ("ASSIGNOR") have made certain inventions, improvements, and discoveries (herein referred to as the "Invention") disclosed in the above-identified patent application and further identified by the IBM Docket Number provided above in the header of this document;

Whereas, International Business Machines Corporation (herein referred to as the "ASSIGNEE"), a corporation of New York having a place of business at Armonk, New York, desires to acquire, and I desire to grant to the ASSIGNEE, my entire worldwide right, title, and interest in and to the Invention and in and to any and all patent applications and patents directed thereto;

Now, therefore, for good and valuable consideration, the receipt and sufficiency thereof being hereby acknowledged, I hereby sell or have sold, assign or have assigned, and otherwise transfer or have transferred to the ASSIGNEE, its successors, legal representatives, and assigns, my entire worldwide right, title, and interest in and to the Invention, the above-identified United States patent application, and any and all other patent applications and patents for the Invention which may be applied for or granted therefor in the United States and in all foreign countries and jurisdictions, including all divisions, continuations, reissues, reexaminations, renewals, extensions, counterparts, substitutes, and extensions thereof, and all rights of priority resulting from the filing of such applications and granting of such patents. In addition, I hereby authorize and request the Director of the United States Patent and Trademark Office to issue any United States Patent, and foreign patent authorities to issue any foreign patent, granted for the Invention, to the ASSIGNEE, its successors, legal representatives, and assigns, my entire worldwide right, title, and interest in and to the same to be held and enjoyed by the ASSIGNEE, its successors, legal representatives, and assigns to the full end of the terms for which any and all such patents may be granted, as fully and entirely as would have been held and enjoyed by me had this Assignment not been made; and I agree to execute any and all documents and instruments and perform all lawful acts reasonably related to recording this Assignment or perfecting title to the Invention and all related patents and applications, in the ASSIGNEE, its successors, legal representatives, and assigns,

IBM DOCKET NUMBER: P201705388US01

whenever requested by the ASSIGNEE, its successors, legal representatives, or assigns.

I acknowledge my prior and ongoing obligations to sell, assign, and transfer my rights under this Assignment to the ASSIGNEE and am unaware of any reason why I may not have the full and unencumbered right to sell, assign, and transfer my rights hereby sold, assigned, and transferred, and have not executed, and will not execute, any document or instrument in conflict herewith. I also hereby grant the ASSIGNEE, its successors, legal representatives, and assigns, the right to insert in this Assignment any further identification (including, but not limited to, patent Application Number) which may be necessary or desirable for recordation of this Assignment. This Assignment is governed by the substantive laws of the State of New York, and any disputes will be resolved in a New York state court or federal court sited in New York.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

(1) Legal Name of Inventor: **Sujatha Kashyap**

Signature: _____ Date: _____

(2) Legal Name of Inventor: **Anne E. Gattiker**

Signature: _____ Date: _____

(3) Legal Name of Inventor: **Kaipeng Li**

Signature: _____ Date: _____

(4) Legal Name of Inventor: **Samuel Thomas**

Signature: _____ Date: _____

[IF MORE INVENTORS, ADDITIONAL SIGNATURE PAGE(S) FOLLOWS]

IBM DOCKET NUMBER: P201705388US01

(5) Legal Name of Inventor: **Minh Ngoc Binh Nguyen**

Signature: _____ Date: _____

(6) Legal Name of Inventor: **Thomas Hubregtsen**

Signature: Tom Hubregtsen Date: 1/24/2018