Meningkatkan Keamanan Identifikasi Pengguna melalui Kombinasi Enkripsi RSA dan Implementasi SHA-256

Marvel Pangondian - 135220751

Program Studi Teknik Informatika

Sekolah Teknik Elektro dan Informatika

Institut Teknologi Bandung, Jl. Ganesha 10 Bandung 40132, Indonesia

113522075@itb.ac.id

*Abstract*—Kriptografi adalah cabang utama dalam ilmu keamanan computer yang melibatkan teknik-teknik matematis dan komputasi untuk mengamankan komunikasi dan informasi. Tujuan kriptografi adalah teknik-teknik matematis dan komputasi untuk mengamankan komunikasi dan informasi. Salah satu algoritma yang digunakan untuk enkrips dan dekripsi teks adalah algoritma RSA, tetapi hanya menggunakan algoritma tersebut dapat menyebabkan berbagai masalah. Salah satunya adalah kunci privat/public yang tidak sesuai ketika mencoba enkripsi/dekripsi teks, serta keamanan enkripsi/dekripsi yang tidak terlalu bervariasi. Dalam makalah ini, akan dibahas penggunaan algoritma hashing yakni algoritma SHA-256 dalam meningkatkan keamanan identifikasi pengguna serta memeriksa integritas kunci publik dan privat yang digunakan.

*Keywords*—Kriptografi, Algoritma RSA, Algoritma SHA-256

# I. PENDAHULUAN

Kriptografi, menurut PGP corporation, adalah ilmu yang menggunakan matematika untuk mengenkripsi dan mendekripsi data. Sejarah kriptografi bermula ribuan tahun yang lalu, dan penciptaannya didorong oleh kebutuhan akan komunikasi yang aman dan perlindungan informasi yang sensitif. Salah satu metode enkripsi dan dekripsi yang terkenal pada peradaban kuno adalah Sandi Caesar, dinamai oleh penemunya Julius Caesar. Julius menciptakan Sandi Caesar karena dia tidak percaya kurir yang mengirimkan surat tersebut.

Kriptografi diciptakan karena kebutuhan manusia untuk menjaga kerahasiaan data yang mereka miliki. Salah satu algoritma yang efektif dalam melakukan hal ini adalah algoritma RSA (*Rivest-Shamir-Adleman*). Algoritma ini akan mengenkripsi dan mendekripsi teks menggunakan dua kunci berbeda yakni kunci privat dan kunci publik. Kunci publik merupakan kunci untuk melakukan enkripsi kepada sebuah teks, kunci ini bersifat publik dan dapat disebarkan. Kunci privat adalah kunci untuk dekripsi, kunci ini tidak dapat disebarkan. Kedua kunci tersebut akan mengenkripsi dan mendekripsi sebuah teks menggunakan teori bilangan yang akan dibahas lebih dalam pada bagian dasar teori

Algoritma RSA merupakan algoritma yang kuat, tetapi memiliki beberapa kelemahan. Apa yang terjadi jika pengguna mencoba untuk mengakses plain text dengan kunci publik/privat yang tidak sesuai ? Atau apa yang terjadi jika enkripsi data diubah, bagaimana pengguna mengetahui hasil enkripsinya telah diubah oleh pihak ketiga ?

To insert images in *Word,* position the cursor at the insertion point and either use Insert | Picture | From File or copy the image to the clipboard and then Edit | Paste Special | Picture. If you are using *Word,* use either the Microsoft Equation Editor or the *MathType* add-on (www.mathtype.com) for equations in your paper (Insert | Object | Create New | Microsoft Equation *or* MathType Equation). “Float over text” should *not* be selected.

# II. Formatting Your Paper

All printed material, including text, illustrations, and charts, must be kept within a print area of 17 cm wide by 25 cm high. Do not write or print anything outside the print area. All *text* must be in a two-column format. Columns are to be 8.25 cm wide, with a 0.5 cm space between them. Text must be fully justified.

The main title (on the first page) should begin 2.5 cm from the top edge of the page, centered, and in Times 20-point, non-boldface type. Capitalize the first letter of nouns, pronouns, verbs, adjectives, and adverbs; do not capitalize articles, coordinate conjunctions, or prepositions (unless the title begins with such a word). Leave a blank line after the title.

Author names and affiliations are to be centered beneath the title and printed in Times 11-point, non-boldface type. Multiple authors may be shown in a two- or three-column format, with their affiliations below their respective names. Affiliations are centered below each author name, italicized, not bold. Include e-mail addresses if possible. Follow the author information by three blank lines before main text.

The second and following pages should begin 2 cm from the top edge. On all pages, the bottom margin should be 2.7 cm from the bottom edge of the page for A4 paper.

Wherever Times is specified, Times Roman, or Times New Roman may be used. If neither is available on your word processor, please use the font closest in appearance to Times that you have access to. Please avoid using bit-mapped fonts if possible. True-Type 1 fonts are preferred. Type your main text in 10-point Times. Be sure your text is fully justified—that is, flush left and flush right. Please do not place any additional blank lines between paragraphs.

# III. Helpful Hints

## A. Figures and Tables

Large figures and tables may span both columns. Place figure captions below the figures; place table titles above the tables. If your figure has two parts, include the labels “(a)” and “(b)” as part of the artwork. Please verify that the figures and tables you mention in the text actually exist. Please do not include captions as part of the figures. Do not put captions in “text boxes” linked to the figures. Do not put borders around the outside of your figures. Use the abbreviation “Fig.” even at the beginning of a sentence. Do not abbreviate “Table.” Tables are numbered with Roman numerals.

Figure axis labels are often a source of confusion. Use words rather than symbols. As an example, write the quantity “Magnetization,” or “Magnetization *M*,” not just “*M*.” Put units in parentheses. Do not label axes only with units. As in Fig. 1, for example, write “Magnetization (A/m)” or “Magnetization (Am1),” not just “A/m.” Do not label axes with a ratio of quantities and units. For example, write “Temperature (K),” not “Temperature/K.”

Multipliers can be especially confusing. Write “Magnetization (kA/m)” or “Magnetization (103 A/m).” Do not write “Magnetization (A/m)  1000” because the reader would not know whether the top axis label in Fig. 1 meant 16000 A/m or 0.016 A/m. Figure labels should be legible, approximately 8 to 12 point type.

## B. References

Number citations consecutively in square brackets [1]. The sentence punctuation follows the brackets [2]. Multiple references [2], [3] are each numbered with separate brackets [1]–[3]. When citing a section in a book, please give the relevant page numbers [2]. In sentences, refer simply to the reference number, as in [3]. Do not use “Ref. [3]” or “reference [3]” except at the beginning of a sentence: “Reference [3] shows ... .”

Number footnotes separately in superscripts (Insert | Footnote)[[1]](#footnote-1). Place the actual footnote at the bottom of the column in which it is cited; do not put footnotes in the reference list (endnotes). Use letters for table footnotes.

Please note that the references at the end of this document are in the preferred referencing style. Give all authors’ names; do not use “*et al*.” unless there are six authors or more. Use a space after authors' initials. Papers that have not been published should be cited as “unpublished” [4]. Papers that have been submitted for publication should be cited as “submitted for publication” [5]. Papers that have been accepted for publication, but not yet specified for an issue should be cited as “to be published” [6]. Please give affiliations and addresses for private communications [7].

## C. Abbreviations and Acronyms

Define abbreviations and acronyms the first time they are used in the text, even after they have already been defined in the abstract. Abbreviations that incorporate periods should not have spaces: write “C.N.R.S.,” not “C. N. R. S.” Do not use abbreviations in the title unless they are unavoidable.

## D. Equations

Number equations consecutively with equation numbers in parentheses flush with the right margin, as in (1). First use the equation editor to create the equation. Then select the “Equation” markup style. Press the tab key and write the equation number in parentheses. To make your equations more compact, you may use the solidus ( / ), the exp function, or appropriate exponents. Use parentheses to avoid ambiguities in denominators. Punctuate equations when they are part of a sentence, as in

 (1)

Be sure that the symbols in your equation have been defined before the equation appears or immediately following. Italicize symbols (*T* might refer to temperature, but T is the unit tesla). Refer to “(1),” not “Eq. (1)” or “equation (1),” except at the beginning of a sentence: “Equation (1) is ... .”

## E. Other Recommendations

Use one space after periods and colons. Hyphenate complex modifiers: “zero-field-cooled magnetization.” Avoid dangling participles, such as, “Using (1), the potential was calculated.” [It is not clear who or what used (1).] Write instead, “The potential was calculated by using (1),” or “Using (1), we calculated the potential.”

Use a zero before decimal points: “0.25,” not “.25.” Use “cm3,” not “cc.” Indicate sample dimensions as “0.1 cm  0.2 cm,” not “0.1  0.2 cm2.” The abbreviation for “seconds” is “s,” not “sec.” Do not mix complete spellings and abbreviations of units: use “Wb/m2” or “webers per square meter,” not “webers/m2.” When expressing a range of values, write “7 to 9” or “7-9,” not “7~9.”

A parenthetical statement at the end of a sentence is punctuated outside of the closing parenthesis (like this). (A parenthetical sentence is punctuated within the parentheses.) In American English, periods and commas are within quotation marks, like “this period.” Other punctuation is “outside”! Avoid contractions; for example, write “do not” instead of “don’t.” The serial comma is preferred: “A, B, and C” instead of “A, B and C.”

If you wish, you may write in the first person singular or plural and use the active voice (“I observed that ...” or “We observed that ...” instead of “It was observed that ...”). Remember to check spelling. If your native language is not English, please get a native English-speaking colleague to proofread your paper.

# IV. Some Common Mistakes

The word “data” is plural, not singular. The subscript for the permeability of vacuum µ0 is zero, not a lowercase letter “o.” The term for residual magnetization is “remanence”; the adjective is “remanent”; do not write “remnance” or “remnant.” Use the word “micrometer” instead of “micron.” A graph within a graph is an “inset,” not an “insert.” The word “alternatively” is preferred to the word “alternately” (unless you really mean something that alternates). Use the word “whereas” instead of “while” (unless you are referring to simultaneous events). Do not use the word “essentially” to mean “approximately” or “effectively.” Do not use the word “issue” as a euphemism for “problem.” When compositions are not specified, separate chemical symbols by en-dashes; for example, “NiMn” indicates the intermetallic compound Ni0.5Mn0.5 whereas “Ni–Mn” indicates an alloy of some composition NixMn1-x.

Be aware of the different meanings of the homophones “affect” (usually a verb) and “effect” (usually a noun), “complement” and “compliment,” “discreet” and “discrete,” “principal” (e.g., “principal investigator”) and “principle” (e.g., “principle of measurement”). Do not confuse “imply” and “infer.”

Prefixes such as “non,” “sub,” “micro,” “multi,” and “"ultra” are not independent words; they should be joined to the words they modify, usually without a hyphen. There is no period after the “et” in the Latin abbreviation “*et al.*” (it is also italicized). The abbreviation “i.e.,” means “that is,” and the abbreviation “e.g.,” means “for example” (these abbreviations are not italicized).

# V. Conclusion

A conclusion section is not required. Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extensions.

# VI. Appendix

Appendixes, if needed, appear before the acknowledgment.

# VII. Acknowledgment

The preferred spelling of the word “acknowledgment” in American English is without an “e” after the “g.” Use the singular heading even if you have many acknowledgments. Avoid expressions such as “One of us (S.B.A.) would like to thank ... .” Instead, write “F. A. Author thanks ... .” Sponsor and financial support acknowledgments are placed in the unnumbered footnote on the first page.

# References

1. G. O. Young, “Synthetic structure of industrial plastics (Book style with paper title and editor),” in *Plastics*, 2nd ed. vol. 3, J. Peters, Ed. New York: McGraw-Hill, 1964, pp. 15–64.
2. W.-K. Chen, *Linear Networks and Systems* (Book style)*.* Belmont, CA: Wadsworth, 1993, pp. 123–135.
3. H. Poor, *An Introduction to Signal Detection and Estimation*. New York: Springer-Verlag, 1985, ch. 4.
4. B. Smith, “An approach to graphs of linear forms (Unpublished work style),” unpublished.
5. E. H. Miller, “A note on reflector arrays (Periodical style—Accepted for publication),” *IEEE Trans. Antennas Propagat.*, to be published.
6. J. Wang, “Fundamentals of erbium-doped fiber amplifiers arrays (Periodical style—Submitted for publication),” *IEEE J. Quantum Electron.*, submitted for publication.
7. C. J. Kaufman, Rocky Mountain Research Lab., Boulder, CO, private communication, May 1995.

# PeRNYATAAN

Dengan ini saya menyatakan bahwa makalah yang saya tulis ini adalah tulisan saya sendiri, bukan saduran, atau terjemahan dari makalah orang lain, dan bukan plagiasi.

Bandung, 3 Desember 2023

Ttd (scan atau foto ttd)

Nama dan NIM

1. It is recommended that footnotes be avoided (except for the unnumbered footnote with the receipt date on the first page). Instead, try to integrate the footnote information into the text. [↑](#footnote-ref-1)